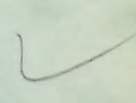


ADAPTATION OF THE IMPROVED ANTI-AIRCRAFT  
ARTILLERY SIMULATION COMPUTER PROGRAM (P001)  
FOR USE AT THE NAVAL POSTGRADUATE  
SCHOOL IN AIRCRAFT COMBAT SURVIVABILITY  
STUDIES.

Carl Frederick Swenson







# NAVAL POSTGRADUATE SCHOOL

## Monterey, California



# THESIS

ADAPTATION OF THE IMPROVED ANTIAIRCRAFT  
ARTILLERY SIMULATION COMPUTER PROGRAM (P001)  
FOR USE AT THE NAVAL POSTGRADUATE SCHOOL  
IN AIRCRAFT COMBAT SURVIVABILITY STUDIES

by

Carl Frederick Swenson

March 1978

Thesis Advisor:

R. E. Ball

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A complete P001/PIP package and user's guide for an aircraft attrition study in the NPS Course AE 3251, Aircraft Combat Survivability, are presented.





Adaptation of the Improved  
Antiaircraft Artillery Simulation Computer Program (P001)  
for Use at the Naval Postgraduate School  
in Aircraft Combat Survivability Studies

by

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Lieutenant Commander, United States Navy  
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Submitted in partial fulfillment of the  
requirements for the degree of

MASTER OF SCIENCE IN AERONAUTICAL ENGINEERING

from the

NAVAL POSTGRADUATE SCHOOL

March 1978





## ABSTRACT

The Air Force Armament Laboratory Antiaircraft Artillery Simulation Computer Program (P001), as modified by Calspan Corporation, was adapted for use on the Naval Postgraduate School IBM 360/65 computer and a preprocessor program (PIP) for P001 was written to facilitate data input to P001 and to complement the P001 output.

The modifications required to convert the Calspan modified P001 from a Control Data Corporation computer program to an NPS IBM 360/65 computer program are described herein. In addition, aircraft characteristics and P001 scenario assumptions, as well as the various P001 Input Program (PIP) options and capabilities, are discussed.

A complete P001/PIP package and user's guide for an aircraft attrition study in the NPS Course AE 3251, Aircraft Combat Survivability, are presented.





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## I. INTRODUCTION

The Air Force Armament Laboratory (AFATL) has developed an antiaircraft artillery (AAA) simulation computer program called P001 which is the present standard program for conducting survivability assessments of aircraft in a hostile AAA environment. P001 is used throughout the aircraft industry and is the aircraft attrition program required by the Department of the Navy MIL-STANDARD-2072(AS), SURVIVABILITY, AIRCRAFT; ESTABLISHMENT AND CONDUCT OF PROGRAMS FOR, August 1977.

Briefly, P001 computes the probability of kill of a target aircraft flying a user-input flight path, as a result of its being fired upon by user-selected antiaircraft artillery located at user-input locations. The technique used by P001 to accomplish this task involves:

- Computation of an aim point with consideration of the errors that can arise therein.
- Simulation of the firing process and the sources of error in the firing process.
- Combination of all the effects of random error into one total projectile trajectory distribution.
- Location of the user-input vulnerable area of the aircraft within the total trajectory distribution.
- Computation of the probability of kill.

P001 has been used in NPS Course AE 3251, Aircraft Combat Survivability, to illustrate the interaction of the various



elements that comprise the aircraft combat survivability problem in a hostile AAA environment. The scenario consists of a typical Naval aircraft on an attack mission. The aircraft's target is the bridge shown in Fig. 1. The student must select a flight path to the target and also the location of the defending AAA. P001 is used to determine the probability of survival of the aircraft.

Use of P001 as an educational tool in aircraft combat survivability studies is very effective since it requires a knowledge of the techniques for calculating aircraft vulnerable areas, as well as the basics of the interaction between the threat, the environment and the target aircraft. Some of the interaction parameters include aircraft vulnerable area, speed, altitude, location and aspect angle with respect to the threat, and aircraft maneuver characteristics; the effect of terrain, target altitude and range on projectile performance; and the antiaircraft artillery threat envelope.

The input to P001 requires many time consuming, tedious computations and a significant amount of keypunching, a use of time that does not profitably contribute to the aircraft combat survivability learning experience. In addition, the realism of the input data has a significant effect on the validity of the result and, up to now, it has not been possible to evaluate input data accuracy. Consequently, a preprocessor computer program that would significantly reduce the time required for a student to prepare the input data, as well as provide an indication as to the realism of the input data, is very desirable.





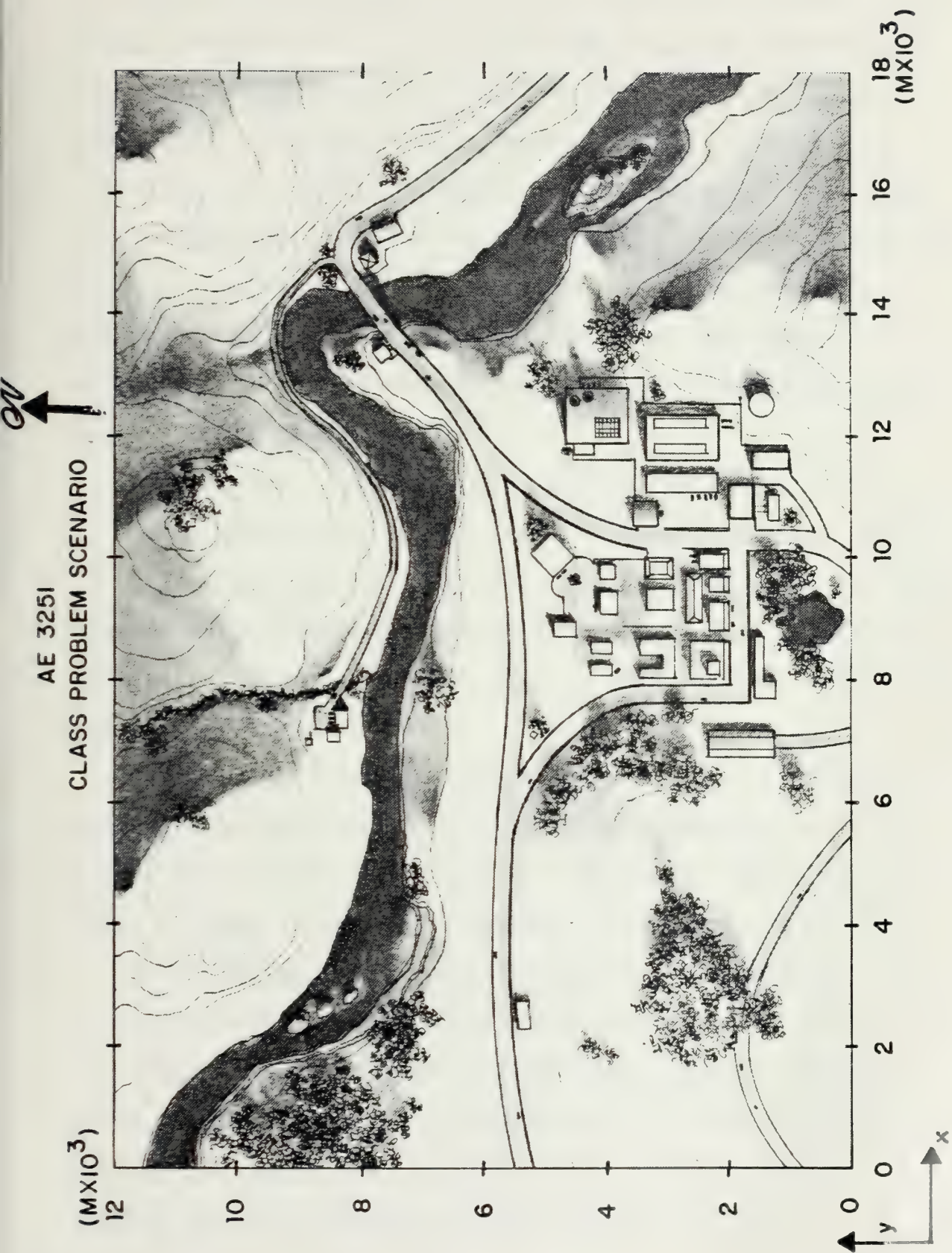


Figure 1



While the preprocessor program was being developed for P001, a version of P001 that was significantly modified by Calspan was obtained from the Air Force Flight Dynamics Laboratory. This improved version of P001 is capable of including the effects of self-contained airborne electronic countermeasures (ECM) on the acquisition/tracking process, of detection system anti-jam capabilities, and of radar beam multipath characteristics. The output of P001 was also expanded. The improved P001 was written for a Control Data Corporation computer system.

The problem solved by this thesis effort is two-fold:

- The adaptation of the improved P001 to the NPS IBM 360/65.
- The development of a P001 input program (PIP) to reduce student time required to prepare the input data required by P001 and to provide an indication of the realism of the input data.

The main body of this thesis describes the adaptation of the improved P001 to the IBM 360/65 and the details of the development of PIP. Appendix A contains a complete package for a problem in aircraft attrition to be used in AE 3251.

The following sources were heavily relied upon for information throughout the entire thesis development process:

- Antiaircraft Artillery Simulation Computer Program - AFATL Program P001 Vol. I User Manual, Air Force Armament Laboratory, Eglin AFB, Florida (Joint Aircraft Attrition Program Advanced Planning Group, September 1973).





- Antiaircraft Artillery Simulation Computer Program -  
Program P001 Program Update, Joint Technical Coordinating  
Group for Aircraft Survivability (Survivability Assessment  
Subgroup, April 1976).

- M. E. Ramaccia, ATS Working Paper No. 9, Calspan Modification to Antiaircraft Artillery Simulation, AFATL Program P001 (Calspan Corporation, Buffalo, New York, 11 August 1977).

- G. Gary Maxwell, The Development of Class Problems for a Course in Aircraft Combat Survivability (Naval Postgraduate School Master's Thesis, 1978).





## II. APPROACH

### A. ADAPTATION OF THE IMPROVED P001 TO THE NPS IBM 360/65

The adaptation of P001 from a CDC computer to the NPS IBM computer involved several hundred computer-unique alterations; that is, changes that had to be made due to the inherent differences between the CDC and IBM computer systems. These changes involved:

- Elimination of the FTNBIN, SECOND, TIMREM and DATE subroutines contained in the CDC system, but not available on the IBM 360 system.

- Substitution of the IBM "REREAD" command for the CDC "DECODE" function.

- Substitution of the IBM "A4" format field descriptor for the CDC "A10" descriptor.

- Substitution of the IBM "" format delimiter for the CDC "\*" delimiter.

- Substitution of IBM-NPS job control language (JCL) cards to accomplish the required input, output, tape usage and core size requirements.

- Extensive reconstruction of the P001 main program by creating the subroutine TOOBIG using the input, output and exits sections of the P001 main program. This permitted a scalar map size small enough for the IBM system to compile and thus avoided the "ROLL SIZE EXCEEDED" error given by the NPS compiler.



## B. DEVELOPMENT OF A PREPROCESSOR FOR P001 (PIP)

In the early stages of AE 3251 it is not desirable for the student to become heavily involved in the many and various facets and options of the P001 program. For this reason, a simple preprocessor computer program to P001 that will provide punched cards for all of the input in the proper format, requiring only a minimum of student involvement, has been developed. For example, the Calspan-modified P001 program requires an input of 196 cards with over 1,400 entries and 860 calculations for a 50 milestone flight scenario involving 7 ground weapons of 4 threat classes. On the other hand, PIP requires an input of 59 cards with 160 entries and no calculations for the same 50 milestone flight scenario and automatically punches the output that fulfills all P001 input requirements in the proper format and order. This significantly reduces the student involvement in the input process.

PIP requires only that the student provide the X, Y and Z coordinates of each of the aircraft flight path milestones as input data, avoiding the many tedious calculations required by full P001 input. In addition, the preprocessor checks the flight path to determine if it exceeds any aircraft performance limits or scenario guidelines. The aircraft built into PIP has performance characteristics approximating those of the A-7 Corsair. The cruise velocity, climb/dive schedules, acceleration/deceleration schedules, dirty/clean velocity limitations, stall velocity and "G" loading limitation values are only representative quantities and are not intended to





accurately describe the performance characteristics of an actual A-7 since the intent of PIP is only to provide representative flight characteristics that demonstrate the principles of aircraft combat survivability in an AAA scenario.

## C. FLIGHT PATH PREPROCESSING

### 1. FORTTRAN Distance Equations

The three cartesian milestone distance components, DX, DY and DZ, are calculated in PIP by taking the difference between the X, Y and Z components of adjacent milestone locations.

Milestone distance component FORTTRAN equations:

$$DX = X(I+1) - X(I)$$

$$DY = Y(I+1) - Y(I)$$

$$DZ = Z(I+1) - Z(I)$$

where,

I = ith milestone

X = milestone x-coordinate location

Y = milestone y-coordinate location

Z = milestone z-coordinate location

DX = milestone x-coordinate distance difference

DY = milestone y-coordinate distance difference

DZ = milestone z-coordinate distance difference.

### 2. Milestone Distance Equations

The distance between successive milestones is the square root of the sum of the squares of the milestone distance components.



Milestone distance FORTRAN equations:

$$DX2 = DX**2$$

$$DY2 = DY**2$$

$$DZ2 = DZ**2$$

$$DIST = \text{SQRT}(DX2 + DY2 + DZ2)$$

where,

DIST = milestone distance

### 3. Heading and Climb Angle Equations

The aircraft heading and climb angle between milestones are calculated in PIP using standard geometrical considerations based on the relative locations of the X, Y and Z coordinates of adjacent flight path milestones.

Aircraft heading FORTRAN equation:

$$HDG(I+1) = \text{ATAN2}(DY,DX)$$

where,

HDG = aircraft heading

Aircraft climb angle FORTRAN equation:

$$CA(I) = \text{ATAN2}(DZ,\text{SQRT}(DX2 + DY2))$$

where,

CA = aircraft climb angle

### 4. Aircraft Speed Equations

The aircraft is assigned a cruise speed of between 206 and 257 meters per second (400 and 500 knots, respectively) at milestone 1 by the user. Aircraft speed at successive locations is calculated based on the altitude change between milestones, since an increase/decrease in altitude decreases/increases aircraft speed proportionately, and from a schedule





based on the present aircraft speed as compared with the initially assigned cruise speed. If the aircraft speed is found to be less/more than the assigned cruise speed, a slow acceleration/deceleration to the assigned cruise speed is assumed. The X, Y and Z components of the velocity at each milestone are then calculated based on the heading and climb angle at the milestone.

Aircraft velocity FORTRAN equations:

$$\begin{aligned} \text{VEL}(1) &= \text{CVEL} \\ \text{VEL}(I+1) &= \text{VEL}(I) - \text{TAN}(\text{CA}(I)) * \text{DIST}/100 \\ &\quad + (\text{CVEL} - \text{VEL}(I)) * (\text{DIST}/\text{VEL}(I)) / 30 \\ \text{VAVG} &= (\text{VEL}(I) + \text{VEL}(I+1)) / 2 \end{aligned}$$

where,

$$\begin{aligned} \text{CVEL} &= \text{aircraft cruise speed} \\ \text{VEL} &= \text{aircraft velocity} \\ \text{VAVG} &= \text{average aircraft velocity} \end{aligned}$$

Aircraft velocity component FORTRAN equations:

$$\begin{aligned} \text{XYVEL} &= \text{VEL}(I) * \text{COS}(\text{CA}(I)) \\ \text{XDOT}(I) &= \text{XYVEL} * \text{COS}(\text{HDG}(I)) \\ \text{YDOT}(I) &= \text{XYVEL} * \text{SIN}(\text{HDG}(I)) \\ \text{ZDOT}(I) &= \text{VEL}(I) * \text{SIN}(\text{CA}(I)) \end{aligned}$$

where,

$$\begin{aligned} \text{XYVEL} &= \text{horizontal velocity component} \\ \text{XDOT} &= \text{x-coordinate velocity component} \\ \text{YDOT} &= \text{y-coordinate velocity component} \\ \text{ZDOT} &= \text{z-coordinate velocity component.} \end{aligned}$$



## 5. Flight Time Equations

The time interval between flight path milestones is calculated by dividing the distance between the milestones by the average velocity between the milestones. The individual milestone time intervals are summed to provide the total time for the scenario.

Flight time FORTRAN equations:

$$T(I+1) = T(I) + \text{DIST}/\text{VAVG}$$

$$\text{DT}(I) = T(I) - T(I-1)$$

where,

$T$  = flight time (cumulative)

$\text{DT}$  = flight time between milestones (I) and (I+1)

## 6. Turn Rate, Roll Angle, "G" Loading

The turn rate required between milestones is calculated from the heading change and the time interval between the milestones. This turn rate and the aircraft speed are used to calculate the "G" loading on the aircraft caused by the turn. The roll angle required for a level turn is calculated from the turn rate and the aircraft speed.

Turn angle FORTRAN equation:

$$\text{TNANG} = \text{HDG}(I+1) - \text{HDG}(I)$$

where,

$\text{TNANG}$  = milestone turn angle.

Turn rate FORTRAN equation:

$$\text{TNRT}(I) = \text{TNANG}/\text{DT}(I)$$

where,

$\text{TNRT}$  = milestone turn rate.





Roll angle FORTRAN equation:

$$RA(I) = ATAN(TNRT(I)*VAVG/9.81)$$

where,

RA = milestone aircraft roll angle.

"G" loading FORTRAN equations:

$$ABSRT(I) = ABS(TNRT(I))$$

$$G(I) = SQRT(ABSRT(I)**2*VEL(I)**2/9.81**2 + 1)$$

where,

ABSRT = absolute value of turn rate

G = "G" loading

#### 7. P001 Stored Time Increments

The equal time increments between successive "P001 stored" positions along the flight path (not milestones) is equal to the total scenario flight time (T) divided by 1000. This time increment is required in the P001 input data card 02.

#### 8. Probability of Kill Accumulation Periods

The total scenario flight time (T) is divided into ten equal time segments in which the probability of kill will be computed for each segment. These ten increments are required on P001 input card 06.

The values computed above are printed and punched on cards that can be used as part of the P001 input data. All data are punched in the specified order to be input to the P001 program.



#### D. AIRCRAFT PERFORMANCE LIMITATIONS, FLIGHT PATH REQUIREMENTS AND ERROR MESSAGES

PIP provides several checks on the performance requirements of the aircraft as it traverses the user-input flight path. It also checks the bombing run portion of the flight path to see if it satisfies the requirements for successful bomb drop. These checks are as follows:

##### 1. Cruise Speed

The aircraft cruise speed is initially input by the user at a value between 206 and 257 meters per second and is changed as dictated by altitude changes and the acceleration/deceleration schedule presented in II.C. If the aircraft is assigned a cruise speed outside of the range from 206 to 257 meters per second, the following cruise speed error message is generated:

Error message: "CRUISE SPEED IS \_\_\_\_\_ METERS PER SECOND WHICH IS NOT WITHIN THE GIVEN LIMITS OF BETWEEN 206 AND 257 METERS PER SECOND."

##### 2. Stall Speed

If the aircraft speed falls below 90 meters per second (175 knots), the following stall error message is generated, identifying the error, the milestone and the velocity value causing the error message:

Error message: "MILESTONE \_\_\_\_ VELOCITY IS \_\_\_\_\_ METERS PER SECOND. STALL OCCURS AT 90 METERS PER SECOND. DECREASE THE CLIMB ANGLE PRIOR TO MILESTONE \_\_\_\_."





### 3. "Red Line"

Prior to the bomb release point, the aircraft is "drag limited" to 260 meters per second (500 knots). After ordnance release, the drag limitation eases to permit a speed of 310 meters per second (600 knots).

### 4. "G" Loading

If the maximum "G" loading of 6 is exceeded, the following turn rate error message is generated, identifying the error, the milestone, the "G" loading and turn rate that caused the error message and denoting the corrective turn angle which will eliminate the error:

Error message: "MILESTONE \_\_\_\_ TURN RESULTS IN A TURN RATE OF \_\_\_\_ DEGREES PER SECOND WHICH RESULTS IN A G LOADING OF \_\_\_\_ WHICH IS IN EXCESS OF THE 6 G MAX LOADING. DECREASE THE TURN ANGLE AT MILESTONE \_\_\_\_ TO BELOW \_\_\_\_ DEGREES."

### 5. Minimum Altitude

If the aircraft descends to an altitude less than 61 meters prior to bomb release, the following error message is generated identifying the error, the milestone and the milestone altitude that caused the error:

Error message: "ALTITUDE AT MILESTONE \_\_\_\_ IS \_\_\_\_ METERS WHICH IS BELOW THE MIN ALT OF 61 METERS."

### 6. Maximum Altitude

If the aircraft attains an altitude greater than 457 meters prior to the "pop-up" maneuver, the following error message is generated identifying the error, the milestone and the milestone altitude that caused the error:



Error message: "ALTITUDE AT MILESTONE \_\_\_\_ IS \_\_\_\_ METERS WHICH IS ABOVE THE MAX ALT PRIOR TO POP UP OF 457 METERS."

7. Overall Maximum Altitude

If, at any time, the aircraft exceeds the overall maximum altitude of 2134 meters, the following error message is generated identifying the error, the milestone and the milestone altitude that caused the error:

Error message: "ALTITUDE AT MILESTONE \_\_\_\_ IS \_\_\_\_ METERS WHICH IS ABOVE THE MAX ALT OF 2134 METERS."

8. Minimum "pop up" Altitude

If, during the "pop up" maneuver, the aircraft fails to attain a minimum altitude of 1219 meters, the following error message is generated identifying the error and the altitude attained during the "pop up" maneuver:

Error message: "MAX ALTITUDE DURING POP UP WAS \_\_\_\_ METERS WHICH IS LESS THAN THE MINIMUM POP UP ALTITUDE OF 1219 METERS."

9. Bomb Release Heading

If the aircraft heading at the time of bomb release is greater than 5 degrees from the true heading to the target, the following error message is generated identifying the error, the aircraft heading and the true heading to the target at the time of bomb release:

Error message: "THE AIRCRAFT HEADING INTO THE BOMB RELEASE POINT IS \_\_\_\_\_. THE HEADING TO THE TARGET IS \_\_\_\_\_."



THE HEADING DIFFERENCE IS \_\_\_\_\_ WHICH IS GREATER THAN THE 5 DEGREE MAXIMUM DIFFERENCE LIMIT."

10. Target Acquisition Time

If the aircraft does not hold a heading of less than 5 degrees from the true heading to the target for a time period of at least 2 seconds on the leg immediately prior to the bomb release point, the following error message is generated identifying the error and the time duration of the leg that caused the error:

Error message: "THE LENGTH OF THE LEG IMMEDIATELY PRIOR TO THE BOMB RELEASE POINT IS \_\_\_\_\_SECONDS IN DURATION WHICH IS LESS THAN THE MINIMUM OF 2 SECONDS."

11. Bomb Release Altitude

If the ordnance is released outside of an altitude envelope of from 305 to 914 meters, the following error message is generated identifying the error and the altitude at bomb release:

Error message: "THE BOMB RELEASE ALTITUDE IS \_\_\_\_\_ METERS WHICH IS NOT IN THE BOMB RELEASE ALTITUDE RANGE OF BETWEEN 305 TO 914 METERS."

12. Bomb Release Range

If the ordnance is released at a distance greater than 1000 meters from the target, the following error message is generated identifying the error and the distance from the target at the time of bomb release:

Error message: "THE BOMB WAS RELEASED AT A DISTANCE OF \_\_\_\_\_ METERS FROM THE TARGET WHICH IS IN EXCESS OF THE 1000 METER MAXIMUM BOMB RELEASE RANGE."





### 13. Gun Location Input Error

If the option is chosen to input the gun locations, but no gun location information is part of the input data or not all of the gun locations are specified, the following error message is generated identifying the error. Program execution terminates after the error message is printed.

Error message: "GUN EMPLACEMENT DATA WAS SPECIFIED AS PART OF THE INPUT DATA; HOWEVER, EITHER NO GUN EMPLACEMENT DATA IS PART OF THE INPUT OR ALL SIX GUN LOCATIONS WERE NOT SPECIFIED. EXECUTION TERMINATES."

### 14. Anti-jam Error

If the anti-jam option is specified, but no jammer is in operation, the following error message will be generated and the anti-jam function will be "turned off":

Error message: "THE ANTI-JAM FUNCTION IS SPECIFIED; HOWEVER, THE JAM FUNCTION IS NOT SPECIFIED. THE ANTI-JAM FEATURE HAS BEEN TURNED OFF."

### 15. Type 3 Gun Range Error

If a type 3 weapon is located within 3,000 meters of the center of the bridge, the following error message will be generated, identifying the error, the position of the gun that caused the error and the actual distance from the target of the gun:

Error message: "GUN TYPE 3 LOCATED AT X: \_\_\_\_ Y: \_\_\_\_ IS \_\_\_\_ METERS FROM THE TARGET WHICH IS LESS THAN THE MINIMUM DISTANCE OF 3000 METERS."



#### 16. Zero Power Jammer Error

If the jamming function has been specified, but the jammer has been assigned a power of zero, the jammer function is "turned off" and the following error message is generated, identifying the error and the fact that the jammer has been "turned off":

Error message: "THE JAM FUNCTION IS SPECIFIED, BUT THE JAMMER POWER IS SPECIFIED AS ZERO. THE JAM FUNCTION HAS BEEN TURNED OFF."

#### 17. Maximum Power Jammer Error

If the jammer has been assigned a power greater than 1000 watts, the following error message is generated, identifying the error. The jammer power will then be limited to 1000 watts.

Error message: "THE SPECIFIED JAMMER POWER IS GREATER THAN 1000 WATTS AND HAS BEEN LIMITED TO 1000 WATTS."

### E. PROGRAM OPTIONS

PIP provides the following electronic warfare options:

#### 1. Jamming Option

An airborne jammer aboard the target aircraft is utilized to degrade radar acquisition/tracking capabilities.

#### 2. Anti-jam Option

Ground weapons that have an anti-jam capability use it to partially nullify the effects of the airborne jammer.

#### 3. Multipath Option

The performance of all radar units which are susceptible to multipath effects is appropriately degraded.





PIP also provides for any combination of the following input/output options:

4. List the P001 Input Deck

A complete listing of all required cards for input to the P001 program is provided. The green "JOB" card and the orange final "EOF" card are not part of this listing. These two cards are the only cards that must be provided by the student to run the P001 program with the PIP output.

5. Punch the P001 Input Deck

A complete punched input deck in the proper format and order to run P001 is provided by this option. Again, no "JOB" or "EOF" card is provided.

6. Plot the P001 Scenario

A plot of the basic geographical features of the scenario, the aircraft flight path and milestone locations, the bomb release point, the gun emplacement locations and the threat radius for each weapon (coded as to weapon type) are provided by this option. Fig. 2 shows a typical PIP scenario plot.

7. Extended Printout Option

An extended printout of the results of the P001 analysis will be provided as output.

8. Gun Location Option

The locations of six of the seven guns in the scenario may be input to the program or preset gun locations may be utilized, as desired.



# AE 3251 P001 SCENARIO

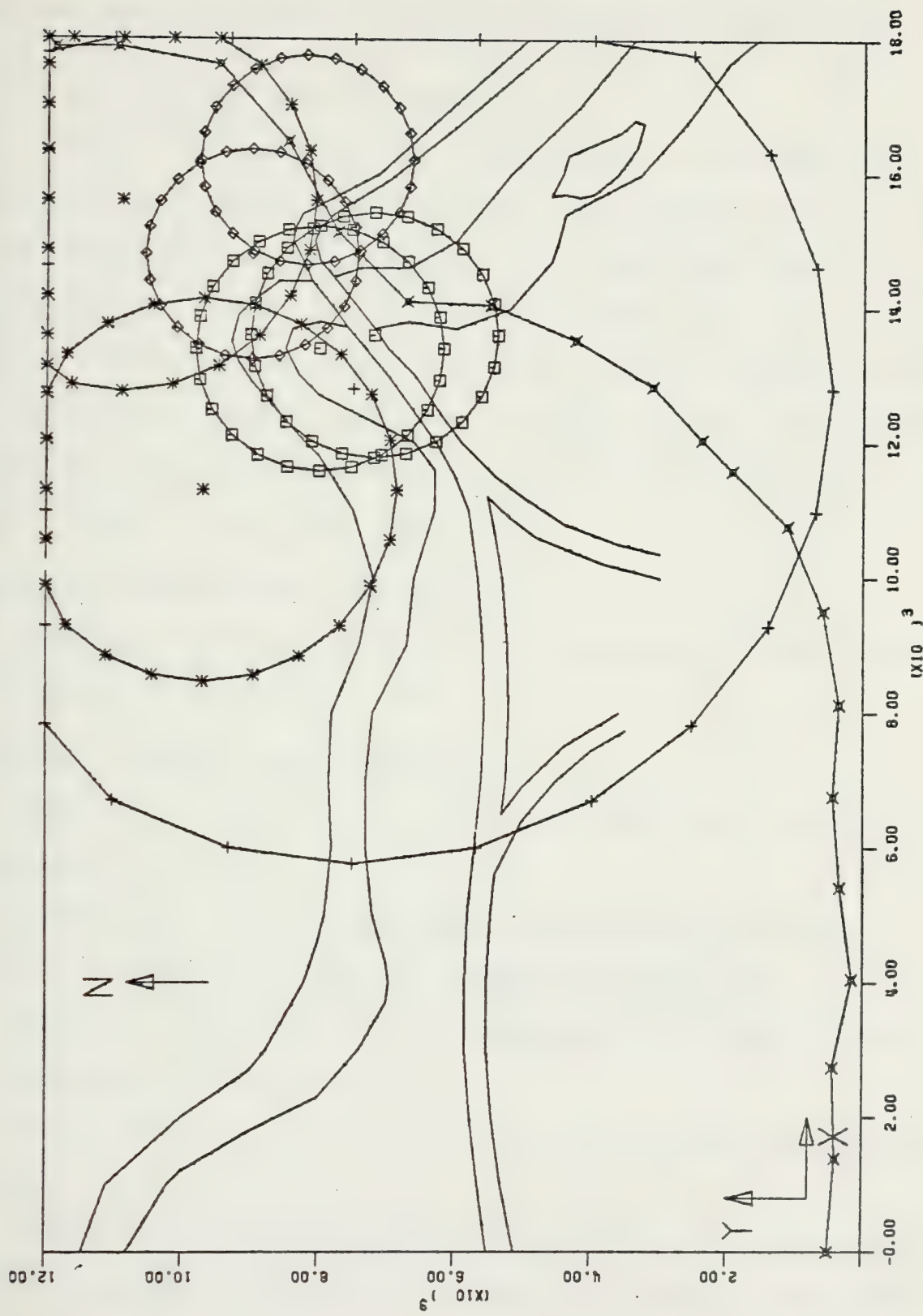


Figure 2 Typical PIP Scenario Plot



In all cases, messages are generated specifying which options were or were not chosen for each execution of PIP.

#### F. PIP INPUT DATA DEFAULT VALUES

In order to significantly reduce student involvement in the P001 input process, PIP assigns predetermined values to many of the options available under the full P001 input. These default values, over which the student has little or no control, were chosen to provide values that are representative of the typical attack situation simulated by the class problem scenario. The following is a list of these default values as they pertain to each P001 input card:

##### 01 Card: Output Header Information

The output header information is assigned "Aircraft Combat Survivability Scenario" by PIP.

##### 02 Card: Initial Flight Path Data

JMODE = 0: The milestone data are read from cards for one milestone at a time.

KMODE = 12: Flight path stored position data will be printed at every 12th position along the flight path.

TMIN = 0: The time at the beginning of the flight path is assigned a value of zero.

TMAX: The time at the end of the flight path is computed by PIP.

DTFPA: The time increment between successive stored positions along the flight path is calculated by PIP as  $TMAX/1000$ .





$XR, YR = 0$ : An x, y reference location in the Flight Path Coordinate System.  $XR$  and  $YR$  are coordinates in the Flight Path Coordinate System of the point located at  $XT, YT$  and  $ZT$  in the General Reference Coordinate System, as shown in Fig. 3.

$XT, YT = 0$ : The x, y coordinates in the General Reference Coordinate System of the point located at  $XR, YR$  in the Flight Path Coordinate System, as shown in Fig. 3.<sup>1</sup>

$PSI = 0$ : The rotational angle required to rotate the Flight Path Coordinate System into the General Reference Coordinate System (positive for counter-clockwise rotation).

$ZT = 0$ : Vertical correction factor to be added to each point of the flight path, as shown in Fig. 3.<sup>1</sup>

#### 2A Card: Flight Path Milestone Input

All data on Card 2A is calculated by PIP based on the cruise speed and milestone coordinates provided by student input.

#### 03 Card: Ground Weapon Complex Coordinates

If the preset weapon location option is chosen, the seven ground weapons used in the class scenario are assigned in the following locations by PIP:

---

<sup>1</sup> Setting  $XR, YR, XT, YT, ZT$  and  $PSI$  equal to zero results in the coincidence of the Flight Path Coordinate System and the General Reference Coordinate System.



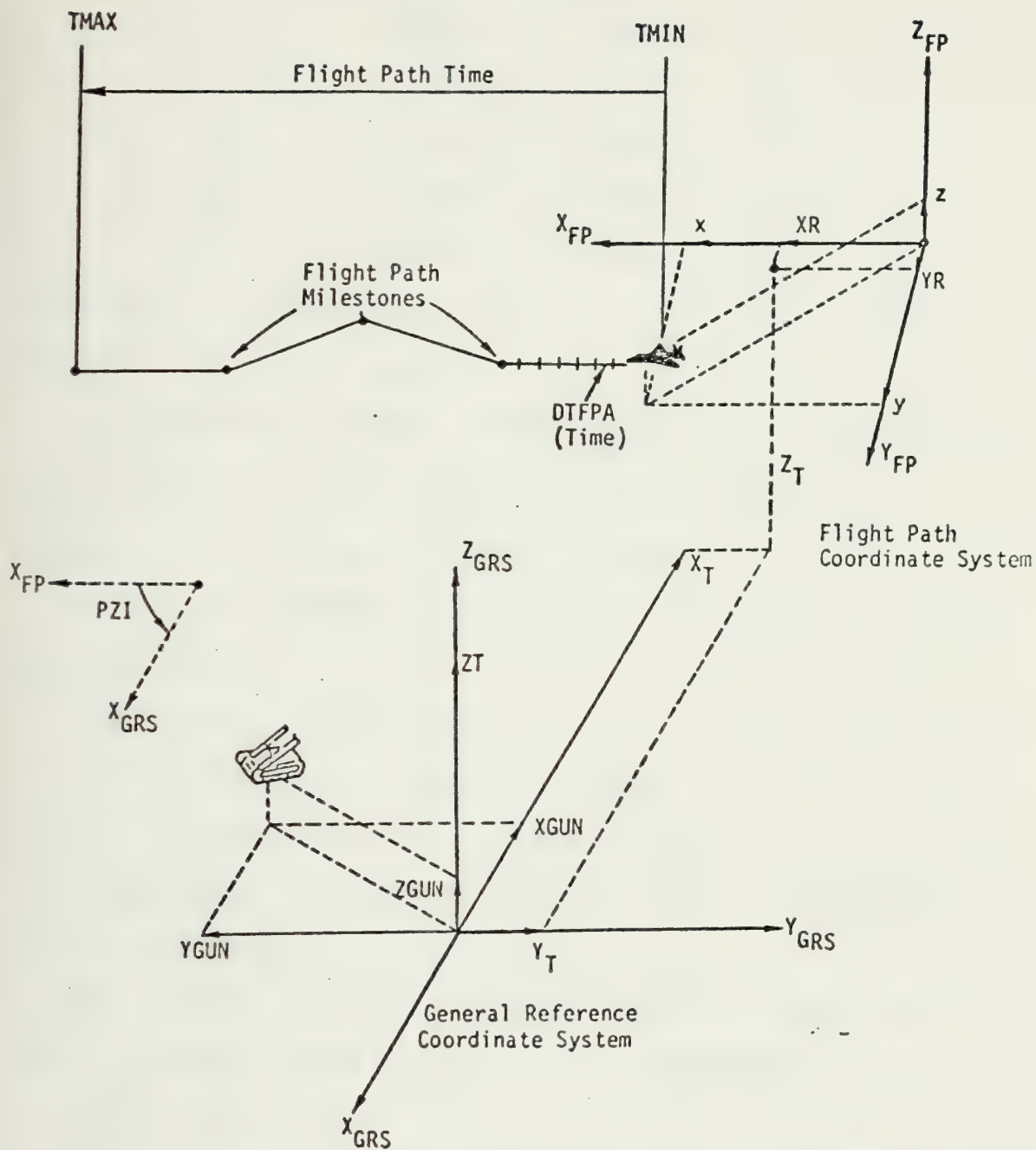


Figure 3 Relationship of the General Reference and Flight Path Coordinate Systems





<u>Gun</u>	<u>XGUN</u>	<u>YGUN</u>	<u>ZGUN</u>
1	14,800	9,000	40
2	16,200	8,200	40
3	13,600	7,200	20
4	13,400	8,000	20
5	11,300	9,700	50
6	15,600	10,900	90
7	12,800	7,500	20

where XGUN, YGUN and ZGUN are as shown in Fig. 3. Fig. 2 shows the weapon locations.

If the preset weapon location option is not chosen, all values on Card 03 are assigned by student input.

#### 04 Card: Ground Weapon Characteristics

Each ground weapon is defined by six parameters. These parameters are:

IGT: Ground weapon type.

IEM: Fire control operation mode.

ICB: Number of barrels of the ground weapon to be fired in a simultaneous manner, where  $ICB \times ISB$  is the number of barrels per weapon.

IGL: Number of ground weapons located in the ground weapon complex. ( $ICB \times ISB \times IGL$  is the number of barrels at one location.)

CIRCLE: Radius of the circle of the ground weapon complex. If there is only weapon in the ground weapon complex, CIRCLE = 0.0.



The default values selected for the six parameters for each of the seven weapons are as follows:

	<u>IGT</u>	<u>IEM</u>	<u>ICB</u>	<u>ISB</u>	<u>IGL</u>	<u>CIRCLE</u>
Gun 1:	1	1	1	1	1	0.0
Gun 2:	1	1	1	1	1	0.0
Gun 3:	2	1	1	1	1	0.0
Gun 4:	2	1	1	1	1	0.0
Gun 5:	3	4	4	1	1	0.0
Gun 6:	3	3	4	1	1	0.0
Gun 7:	5	3	2	1	1	0.0

05 Card: Ground Weapon Complex Density Factors

IF5 = 0: Ground weapon complex density factors are not printed.

NRHOS = 1: The number of ground weapon density factors equals one.

RHO(1) = 1.0; RHO(2) through RHO(9) = 0.0: Generally, RHO = (number of possible ground weapon complexes in the engagement divided by the number of possible ground weapon complex locations in the scenario).

06 Card: Flight Path  $P_k$  Accrual Time Intervals ( $P_k$  = probability of kill)

IF6 = 1: Flight path  $P_k$  accrual time intervals are printed.

NTINTS = 9: One less than the total number of flight path time intervals to be considered. P001 adds one additional time interval for  $P_k$ 's accumulated from NTINTS to infinity.



TINTER(1) through TINTER(9): TINTER values are assigned by PIP. Each TINTER is an increment representing 1/10th of the total flight path time.

07 Card: Aircraft Vulnerable Area Table Title

- ICARD = a. "Vulnerable Area Table vs Type 1 and 2 Weapons",  
b. "Vulnerable Area Table vs Type 3 Weapons",  
c. "Vulnerable Area Table vs Type 5 Weapons"

7A Card: Aircraft Vulnerable Area Tables

The values assigned by PIP to the three aircraft vulnerable area tables representing the three senario threat classes are given in Tables I, II and III respectively.

08 Card: Ground Weapon Reaction and Tracking Times

Card 08 is omitted by PIP. Values are assigned within P001.

09 Card: Ground Weapon Parameters

Card 09 is omitted by PIP. Values are assigned within P001.

9A Card: Ground Weapon Parameters

Card 9A is omitted by PIP. Values are assigned within P001.

10 Card: Ground Weapon Projectile Parameters

Card 10 is omitted by PIP. Values are assigned within P001.

11 Card: Logical Unit Input Option

Card 11 is omitted by PIP. Logical Unit 5 is assigned for input within P001.





07	VULNERABLE	AREA	TABLE	VS	TYPE	1	ANC	2	WEAPONS
0.464	0.464	7.107	7.107	7.107	7.107	7.107	7.107	7.107	7.107
0.657	0.657	5.551	5.551	5.551	5.551	5.551	5.551	5.551	5.551
0.697	0.697	5.574	5.574	5.574	5.574	5.574	5.574	5.574	5.574
0.697	0.697	7.357	7.357	7.357	7.357	7.357	7.357	7.357	7.357
0.697	0.697	5.551	5.551	5.551	5.551	5.551	5.551	5.551	5.551
0.697	0.697	5.574	5.574	5.574	5.574	5.574	5.574	5.574	5.574
0.697	0.697	7.357	7.357	7.357	7.357	7.357	7.357	7.357	7.357
0.464	0.464	5.574	5.574	5.574	5.574	5.574	5.574	5.574	5.574
0.657	0.657	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743
0.657	0.657	2.858	2.858	2.858	2.858	2.858	2.858	2.858	2.858
0.657	0.657	2.858	2.858	2.858	2.858	2.858	2.858	2.858	2.858
0.464	0.464	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743
0.657	0.657	2.858	2.858	2.858	2.858	2.858	2.858	2.858	2.858
0.657	0.657	2.858	2.858	2.858	2.858	2.858	2.858	2.858	2.858
0.657	0.657	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743
0.657	0.657	2.858	2.858	2.858	2.858	2.858	2.858	2.858	2.858
0.657	0.657	2.858	2.858	2.858	2.858	2.858	2.858	2.858	2.858
0.697	0.697	5.551	5.551	5.551	5.551	5.551	5.551	5.551	5.551
0.657	0.657	5.574	5.574	5.574	5.574	5.574	5.574	5.574	5.574
0.657	0.657	7.357	7.357	7.357	7.357	7.357	7.357	7.357	7.357
0.657	0.657	5.551	5.551	5.551	5.551	5.551	5.551	5.551	5.551
0.657	0.657	5.574	5.574	5.574	5.574	5.574	5.574	5.574	5.574
0.657	0.657	7.357	7.357	7.357	7.357	7.357	7.357	7.357	7.357
0.464	0.464	5.574	5.574	5.574	5.574	5.574	5.574	5.574	5.574

TABLE I. Aircraft Vulnerable Area Table (Type 1 and 2 Weapons)



07	VULNERABLE	AREA	TABLE	VS	TYPE	3	WEAPONS					
12.540	12.540	13.470	13.470	13.470	13.470	13.470	13.470	13.470	13.470	13.470	13.470	13.470
9.853	9.853	10.510	10.510	10.510	10.510	10.510	10.510	10.510	10.510	10.510	10.510	10.510
9.639	9.639	11.150	11.150	11.150	11.150	11.150	11.150	11.150	11.150	11.150	11.150	11.150
12.640	12.640	14.780	14.780	14.780	14.780	14.780	14.780	14.780	14.780	14.780	14.780	14.780
9.853	9.853	11.150	11.150	11.150	11.150	11.150	11.150	11.150	11.150	11.150	11.150	11.150
9.853	9.853	10.510	10.510	10.510	10.510	10.510	10.510	10.510	10.510	10.510	10.510	10.510
9.639	9.639	11.150	11.150	11.150	11.150	11.150	11.150	11.150	11.150	11.150	11.150	11.150
12.640	12.640	14.780	14.780	14.780	14.780	14.780	14.780	14.780	14.780	14.780	14.780	14.780
9.639	9.639	11.150	11.150	11.150	11.150	11.150	11.150	11.150	11.150	11.150	11.150	11.150
1.394	1.394	1.394	1.394	1.394	1.394	1.394	1.394	1.394	1.394	1.394	1.394	1.394
4.762	4.762	6.240	6.240	6.240	6.240	6.240	6.240	6.240	6.240	6.240	6.240	6.240
5.342	5.342	7.432	7.432	7.432	7.432	7.432	7.432	7.432	7.432	7.432	7.432	7.432
4.762	4.762	6.240	6.240	6.240	6.240	6.240	6.240	6.240	6.240	6.240	6.240	6.240
1.394	1.394	1.394	1.394	1.394	1.394	1.394	1.394	1.394	1.394	1.394	1.394	1.394
4.762	4.762	6.240	6.240	6.240	6.240	6.240	6.240	6.240	6.240	6.240	6.240	6.240
5.342	5.342	7.432	7.432	7.432	7.432	7.432	7.432	7.432	7.432	7.432	7.432	7.432
9.853	9.853	6.240	6.240	6.240	6.240	6.240	6.240	6.240	6.240	6.240	6.240	6.240
9.639	9.639	10.510	10.510	10.510	10.510	10.510	10.510	10.510	10.510	10.510	10.510	10.510
12.640	12.640	14.780	14.780	14.780	14.780	14.780	14.780	14.780	14.780	14.780	14.780	14.780
9.853	9.853	11.150	11.150	11.150	11.150	11.150	11.150	11.150	11.150	11.150	11.150	11.150
9.639	9.639	11.150	11.150	11.150	11.150	11.150	11.150	11.150	11.150	11.150	11.150	11.150
12.640	12.640	14.780	14.780	14.780	14.780	14.780	14.780	14.780	14.780	14.780	14.780	14.780
9.639	9.639	11.150	11.150	11.150	11.150	11.150	11.150	11.150	11.150	11.150	11.150	11.150
12.540	12.540	13.470	13.470	13.470	13.470	13.470	13.470	13.470	13.470	13.470	13.470	13.470

TABLE II. Aircraft Vulnerable Area Table (Type 3 Weapons)









### 13 Card: Radar Multipath Parameters

IMUL: Assigned by the user on the PIP option card. If IMUL = 0, no multipath effects are considered. If IMUL = 1, multipath radar effects are taken into consideration in the P001 analysis.

IRMP: Radar type identification assigned by PIP, specifying the tracking radar. The value of IRMP indicates appropriate radar parameters within P001. The value of IRECM, assigned by PIP on Card 14, dictates the value of IRMP. The radar parameters and the relationship between IRMP and IRECM are as follows:

	<u>IRECM</u>	<u>IRMP</u>	<u>Beamwidth (deg)</u>	<u>Squint Angle (deg)</u>	<u>Calibration Constant</u>
Gun 6:	1	1	1.4	0.5	0.759
Gun 7:	2,3	2	1.8	0.6	1.060

Multipath radar effects do not apply to guns 1 through 5.

REFC = 0.35: Reflection coefficient. 0.35 is a typical value for terrain with vegetation.

### 14 Card: ECM (Jamming) Parameters

IJAM: Assigned by the user on the PIP option card. 0 = no jamming. 1 = jamming effects considered in P001 analysis.

IP = 5: Print every 5th value in J/S printout.

IJ = 0. Therefore, GAINJ is the antenna gain of the jammer.

GAINJ = 1.0: The antenna gain of the jammer is 1.0.

PJW: Jammer power, assigned by the user on the PIP option card.



PLEN = 1.0E-06: The length of the jammer cover pulse is 1 microsecond, a standard value.

IX = 1: A radar cross section table is provided by PIP. (Table IV).

XSEC = 0: XSEC is not used if IX = 1. If used (IX = 0), a constant cross section of XSEC m<sup>2</sup> is used.

CALX = 1: The radar cross section table is not scaled.

IRECM: The value of IRECM defaulted by PIP depends upon the gun type and mode. IRECM calls up certain radar parameters from a data statement within P001. IRECM values and the relationship with the gun type and mode are as follows:

<u>Gun Type</u> (IGT)	<u>Mode</u> (IEM)	<u>Radar ID</u> (IRECM)	<u>Gain</u> (RGDB)	<u>Power</u> (PRW)	<u>Frequency</u> (FREQ)	<u>SJTMAX</u>
1	1	N/A	N/A	N/A	N/A	N/A
2	1	N/A	N/A	N/A	N/A	N/A
3	3,4	1	40.0 dB	150,000	15.1E9	3.0 dB
5	3	2 (no AJ)	38.5 dB	175,000	9.38E9	1.5 dB
5	3	3 (AJ)	38.5 dB	175,000	9.38E9	17 dB

SJTMAX: Assigned by PIP as indicated above. SJTMAX is the threshold where tracking errors become significant.

RGDB, PRW, FREQ: Assigned within P001.

#### 12 Card: Print Options for Output

IPRINT(1) through IPRINT(7): If the extended output option is chosen by the user on the PIP option card, IPRINT(1) through IPRINT(7) = 1 and an extended printout of the result of the P001 analysis is obtained. If the extended output





[illegible]



option is not chosen, IPRINT(1) through IPRINT(7) = 0 and a summary of the P001 analysis is printed as output from P001.



### III. SUMMARY AND CONCLUSIONS

The use of the P001 Input Program (PIP) to provide all required input to P001 greatly reduces the student involvement in the aircraft combat survivability scenario computer input procedure, freeing him from time consuming, tedious computations and keypunching which do not contribute profitably to the aircraft combat survivability learning experience. In addition, PIP provides an indication as to the realism of the input data, thus contributing to the validity of the result of the P001 analysis.

Introduction of the Calspan Improved P001 Computer Program into aircraft combat survivability studies provides the class problem in survivability assessment with ECM (jamming), ECCM (anti-jam) and radar multipath features which are realistic parameters to be considered in any current aircraft combat survivability situation.

As developed, the PIP target aircraft performance parameters are those of a "typical" Navy attack aircraft, having flight characteristics that are realistic, but which can not be used to describe the performance of any specific aircraft. As a future project, specific aircraft flight performance parameters and equations could be added to PIP in the form of a flight path generator program to give the input program the added capability of simulating the flight path of a specific aircraft.





APPENDIX A

AIRCRAFT COMBAT SURVIVABILITY PROBLEM

This Appendix contains a complete package for a class problem in aircraft attrition in a hostile AAA environment for AE 3251, Aircraft Combat Survivability.



AE 3251

AIRCRAFT COMBAT SURVIVABILITY

A STUDY

of

AIRCRAFT ATTRITION

in a

HOSTILE AAA ENVIRONMENT

NAVAL POSTGRADUATE SCHOOL  
MONTEREY, CALIFORNIA



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## I. INTRODUCTION

This aircraft attrition study is designed to present the student with an opportunity to see first hand how the survivability of an aircraft can be evaluated in a given combat scenario. The methods employed in this study are those used by both industry and government when making crucial decisions in the survivability design of an aircraft weapon system. In this study, a computer program named P001 (AFATL Antiaircraft Artillery Simulation Computer Program) will be used to (1) simulate the flight of a typical Naval attack aircraft through a hostile antiaircraft artillery (AAA) environment and (2) compute the aircraft probability of survival.<sup>1</sup>

Section II describes all of the steps necessary to complete this study. Note the flow of the survivability assessment process from a physical description of the aircraft to a determination of its capabilities to withstand certain threat levels (i.e., its vulnerability), to a scenario in which both offensive and defensive strategies must be employed, to the final phase of simulating flight through the hostile environment and computing probabilities of survival using a modern, state-of-the-art computer program.

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<sup>1</sup> The Navy specifies the use of P001 in all non-nuclear survivability assessments in MIL-STANDARD-2072(AS), SURVIVABILITY, AIRCRAFT; ESTABLISHMENT AND CONDUCT OF PROGRAMS FOR, August 1977.



The student should develop a good appreciation for the magnitude of the survivability problem by keeping the above survivability assessment process in mind when working each part of the analysis.



## II. PROBLEM DEFINITION

- A. You are going to conduct a survivability assessment of a familiar Naval aircraft, shown in Figs. 1 and 2, on a typical attack mission to destroy the bridge shown in Fig. 3.
- B. The class will be divided into groups of four, with two members in each group on the blue team and two members on the red team.
- C. Each team will independently determine the vulnerable areas of the aircraft to the specified threat in the six major views.
- D. Each team will use P001 to determine the survivability of the aircraft in the class problem scenario, as follows:
  - 1. Each team will select a flight path to the bridge according to the rules of the scenario given in Section IV. Keep this path a secret.
  - 2. Each team will also select the locations of six AAA emplacements that will defend the bridge against an air attack. Locate the weapons according to the order of battle given in Section IV. Keep these locations secret, also.
  - 3. Each team will conduct an attack against the other team in the group.
  - 4. The input data cards for the computer run for the blue team attacking the bridge defended by the red team





will consist of the flight path of the blue aircraft flying through the AAA emplacements selected by the red team.

5. The input data cards for the computer run for the red team against the blue team will consist of the flight path of the red aircraft flying through the AAA emplacements selected by the blue team.

- E. May the best team win. A small prize will be awarded to the team whose aircraft has the highest probability of survival against their opponent's weapon distribution.
- F. Additional runs will be made against a preset AAA distribution to investigate the effects of ECM, ECCM, jinking, etc., on the survivability of the aircraft.



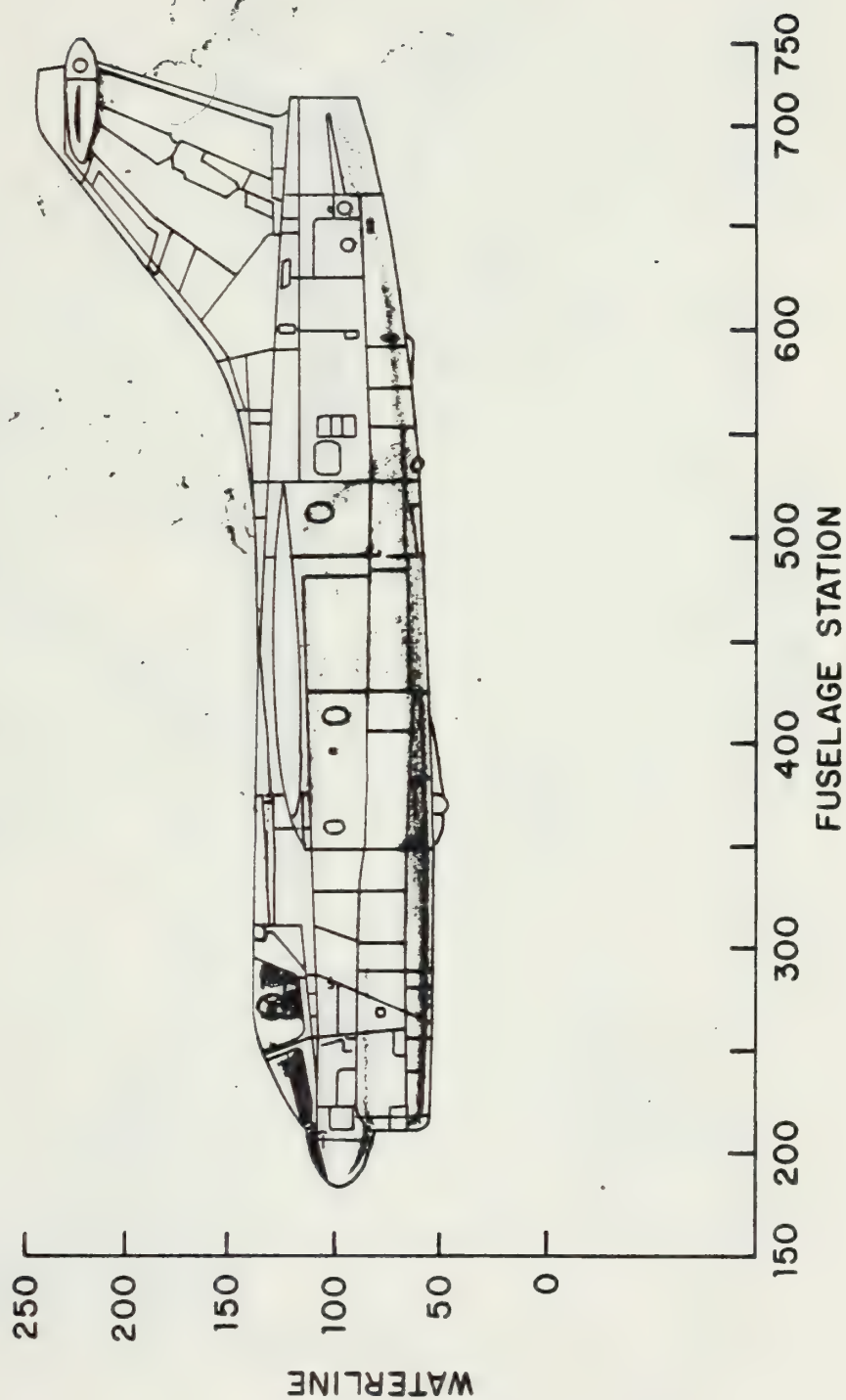


Figure 1



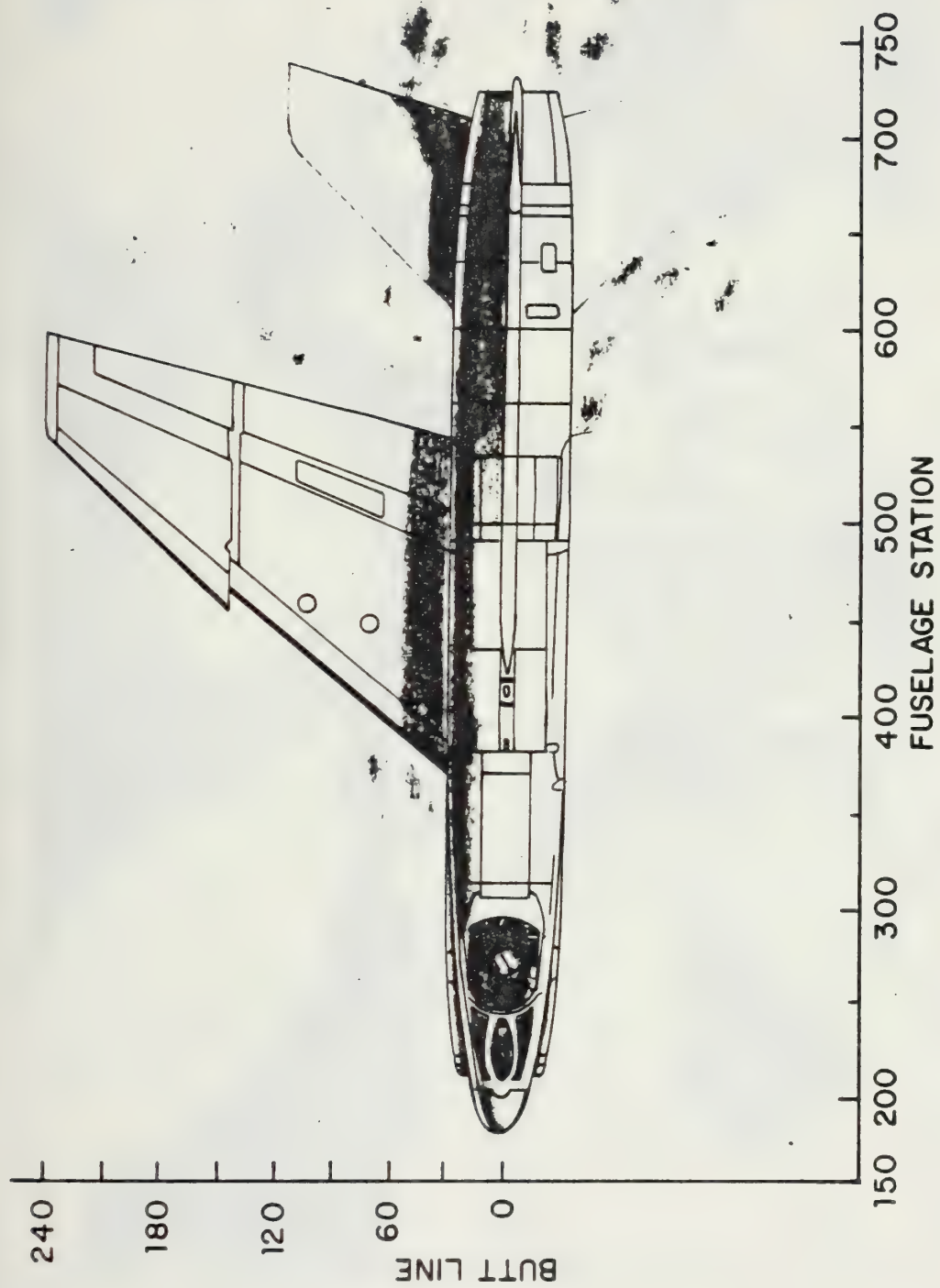


Figure 2





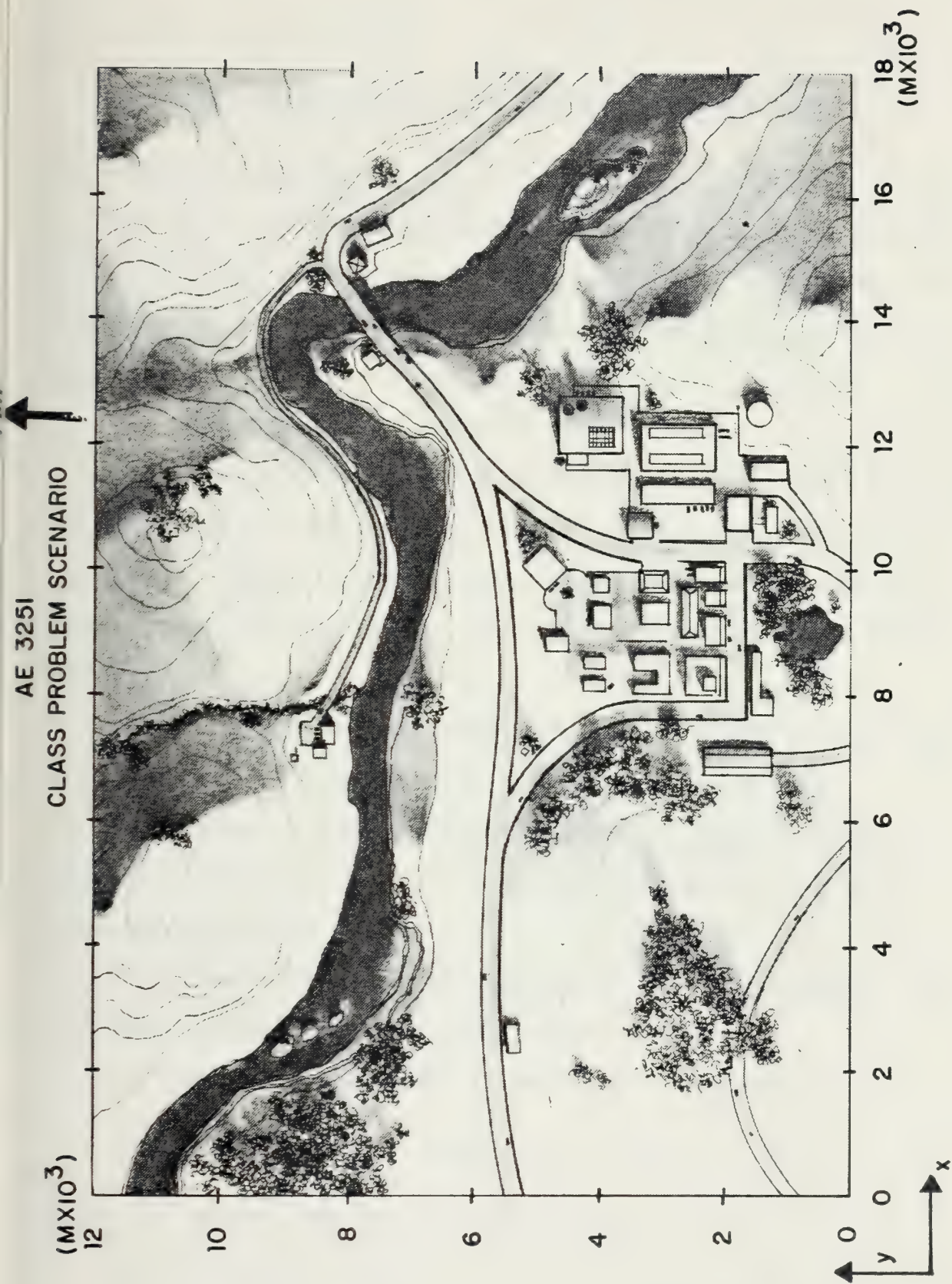


Figure 3



### III. VULNERABILITY ASSESSMENT DESCRIPTION

#### A. GENERAL METHODOLOGY

The six general requirements for a vulnerability assessment are discussed in detail in Chapter IV of the class text. The following data are given in support of this assessment procedure:

1. Kill Category = "A" Kill
2. Technical Description of the Aircraft - Figs. 1 and 2
3. Critical Components - Pilot, engine and fuel tanks.

a. Each of these singly vulnerable components will make a contribution to  $A_{p_i}$ , the total presented area of the aircraft.

b. The total presented area is assumed to be a "shoe box" centered around the aircraft center of gravity.

4. Damage Analysis - Determination of  $P_{K/H}$  for each of the components will be discussed in class due to the classified nature of the material.

5. Threat Types - To be discussed in class; Types I, II, III and V threats will be used in the scenario.

6. Determine Vulnerable Area - Use the equation:

$$A_v = \sum_i A_{p_i} \cdot P_{K/H_i}$$

where  $i$  = pilot, engine and fuel tanks.





## B. SPECIFIC CALCULATIONS

The vulnerability assessment may now be completed in the following manner:

1. Measure the presented area of each critical component of the aircraft shown in Figs. 1 and 2 for the top/bottom, front/rear and left/right aspects and record in Table I.

2. Calculate the  $A_{V_i}$  for each component using the given  $P_{K/H_i}$  for the appropriate aspect and striking velocity and enter it into Table I.

3. In order to use the information compiled in Table I in P001, a more complete description of the aircraft  $A_V$  with changing aspect angle must be tabulated. This is normally done in a 26 view, 8 striking velocity vulnerable area table (VAT). Fig. 4 and Table II show how the aircraft is physically divided into these 26 different views. You have tabulated in Table I the total  $A_V$  for each of the striking velocities, but only for the six major aspects. The vulnerable area of the other views can be obtained by interpolating between these six aspects. The following is a summary of the six views you have done in Table I and their relationship to the 26 views needed to describe the aircraft:





View	View #	Long (AZ) (degrees)	Lat (Elev) (degrees)
Bottom	1	0	0
	2-9	0-315	45
Tail-on	10	0	90
	11	45	90
STBD Side	12	90	90
	13	135	90
Head-on	14	180	90
	15	215	90
Port Side	16	270	90
	17	315	90
	18-25	0-315	135
TOP	26	0	180

The  $A_v$ 's you have calculated will not be used in the P001 analysis. Instead, predetermined VATS for each threat type will be used in order to provide a standardized aircraft for the attrition study.

4. Turn in Table I prior to initiating a computer run for the analysis.



TABLE I.

SINGLY VULNERABLE AREA (A <sub>v</sub> ) SUMMARY FORM															
Assessment Data				Aircraft Threat											
Performing Organization															
Kill Category															
Projectile V <sub>s</sub> , ft/sec (m/sec)		500 (152.4)		1,000 (304.8)		1,500 (457.2)		2,000 (609.6)		2,500 (762.0)		3,000 (914.4)		3,500 (1066.8)	
Aspect	Component	A <sub>P</sub>	P <sub>K/H</sub>	A <sub>V</sub>	P <sub>K/H</sub>	A <sub>V</sub>	P <sub>K/H</sub>	A <sub>V</sub>	P <sub>K/H</sub>	A <sub>V</sub>	P <sub>K/H</sub>	A <sub>V</sub>	P <sub>K/H</sub>	A <sub>V</sub>	P <sub>K/H</sub>
TOP/ BOTTOM	PILOT														
	ENGINE														
	FUEL TANKS														
	WINGS														
	TOTAL														
FRONT/ REAR	PILOT														
	ENGINE														
	FUEL TANKS														
	WINGS														
	TOTAL														
LEFT/ RIGHT	PILOT														
	ENGINE														
	FUEL TANKS														
	WINGS														
	TOTAL														



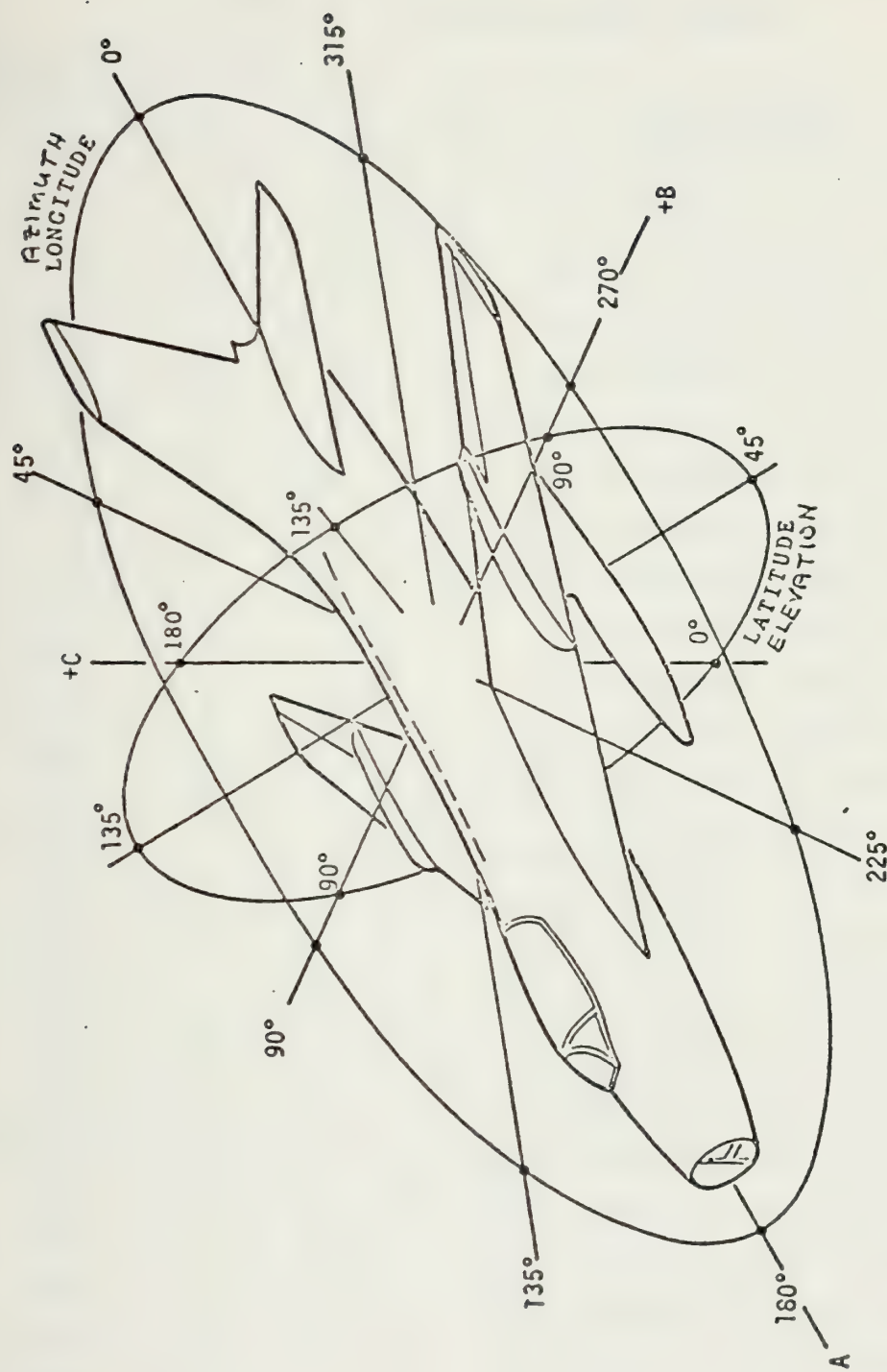


Figure 4 Longitude and Latitude of Aircraft for Vulnerable Area Computation





TABLE II VULNERABLE AREA TABLES

Card Number	I	J	Aircraft View
1	1	1	0° Longitude, 0° Latitude
2	1	2	0° Longitude, 45° Latitude
3	2	2	45° Longitude, 45° Latitude
4	3	2	90° Longitude, 45° Latitude
5	4	2	135° Longitude, 45° Latitude
6	5	2	180° Longitude, 45° Latitude
7	6	2	225° Longitude, 45° Latitude
8	7	2	270° Longitude, 45° Latitude
9	8	2	315° Longitude, 45° Latitude
10	1	3	0° Longitude, 90° Latitude
11	2	3	45° Longitude, 90° Latitude
12	3	3	90° Longitude, 90° Latitude
13	4	3	135° Longitude, 90° Latitude
14	5	3	180° Longitude, 90° Latitude
15	6	3	225° Longitude, 90° Latitude
16	7	3	270° Longitude, 90° Latitude
17	8	3	315° Longitude, 90° Latitude
18	1	4	0° Longitude, 135° Latitude
19	2	4	45° Longitude, 135° Latitude
20	3	4	90° Longitude, 135° Latitude
21	4	4	135° Longitude, 135° Latitude
22	5	4	180° Longitude, 135° Latitude
23	6	4	225° Longitude, 135° Latitude
24	7	4	270° Longitude, 135° Latitude
25	8	4	315° Longitude, 135° Latitude
26	1	5	0° Longitude, 180° Latitude

NOTE: Refer to Figure 4 for definition of longitude and latitude.



#### IV. SCENARIO DESCRIPTION

A. This scenario is purely for instructional purposes and is not based on any actual or planned combat attack situation. The target site, order of battle, attack heading, and outbound flight path parameter limits have been chosen only to provide guidelines for the class problem. As much realism has been introduced for the players as possible while retaining an unclassified scenario.

B. Your target is the bridge shown in Fig. 3. located at:

x: 14,100 meters

y: 7,900 meters

z: 20 meters

Heavy military supply traffic has been reported in this area. Your mission is to destroy this vital supply link.

C. The following order of battle has been gathered from intelligence reports of the target area:

Interceptor Aircraft - three airfields within striking distance

SAM - six sites within a 125 km radius.

AAA - two type 1 mode 1  
two type 2 mode 1  
one type 3 mode 4  
one type 3 mode 3  
one type 5 mode 3

(Note: Gun types and their relationship to AAA will be discussed in class.)



Ground Troops - regular infantry and civilian militia are numerous in the target area.

D. The SAM threat and the presence of enemy aircraft requires that the inbound approach to the target be made from the west at low level. A pop-up maneuver is required to visually identify the target followed by a dive bombing run to weapon delivery. Egress must be made to either the north or south, depending on individual strategy.

E. The following is a list of scenario limitations to be used in the development of your strategy:

1. Flight path milestones - specify at least one milestone for approximately 500 meters of flight path.
2. Aircraft cruise speed - 210 to 250 meters per second.
3. Inbound altitude - 70 to 450 meters.
4. Pop-up maneuver
  - a. Commence maneuver - 4,000 to 6,000 meters from the target.
  - b. Maneuver altitude - minimum 1,220 meters; maximum 2,130 meters.
5. Weapons delivery.
  - a. Alignment - the leg immediately prior to the bomb release point must be 600 meters in length (straight) and must have a heading within 5° of the heading to the target from the bomb release point.
  - b. Bomb release range - 1,000 meters maximum.
  - c. Bomb release altitude - 310 to 910 meters.





(Note: A typical 20° dive commenced from 1,000 meters of altitude at 2,500 meters from the target will release weapons at 400 meters of altitude about 700 meters from the target and will lose 160 meters in the pull-out.)

6. Maneuvering - if any turn along the flight path is greater than 28°, the maximum g loading of 6 will be exceeded.

7. Weapons placement.

a. Two type 1 mode 1, two type 2 mode 1, one type 3 mode 4, and one type 3 mode 3 weapons are available for defense placement.

b. One type 5 mode 3 weapon is placed at x: 12,800 meters, y: 7,500 meters, and z: 20 meters. You do not specify the location of this weapon.

c. Neither of the type 3 weapons may be placed within 3,000 meters of the center of the bridge.

8. Jammer power - if the jamming function is specified, the jammer power you select must be no more than 1,000 watts.

F. Begin the flight path at an entry point of your choosing along the western boundary and end it along the northern or southern boundary. Note the terrain features, anticipate the AAA placement for bridge defense and plan your flight path accordingly.

G. Locate the AAA weapons given in the order of battle to best defend the bridge against your opponent's attacking aircraft.



## V. INPUT DATA PREPARATION

A preprocessor for P001 has been developed at NPS that will punch all of the input cards for the execution of P001, with the exception of the green JOB card and the final orange END OF FILE card. This preprocessor is called PIP (P001 Input Program). The inputs to PIP are the x, y and z coordinates of your flight path milestones and your opponent's six AAA emplacement locations.

A. Milestone cards: The x, y and z coordinates of the aircraft (in meters) for up to 199 flight path milestones must be entered into PIP in 3F10.0 format, one milestone per card. (Milestone #1 will have an x coordinate of 0.0).

B. Milestone delimiter card: A card containing 99999., left justified, must be placed after the final milestone card.

C. Option control card: A control card follows the milestone delimiter card and specifies the aircraft cruise speed, the number of the bomb release milestone (count the initial position on the western border as milestone #1), eight input/output/scenario options and the jammer power. The data on the control card must be specified in F10.0,I2,8I1,F10.0 format and contains the following parameters:

(columns 1-10): Aircraft cruise speed in meters per second

(columns 11-12): Number of the bomb release milestone.



- (column 13): EW option - 0 for no jamming, 1 for jamming.
- (column 14): ECCM anti-jam option - 0 for no AJ, 1 for radar AJ.
- (column 15): Radar multipath option - 0 for no multipath effects, 1 for radar degradation caused by multipath effects.
- (column 16): Gun location option - 0 specifies PIP preset AAA locations, 1 requires user input of the six AAA locations.
- (column 17): List option - 0 for no listing of the P001 input deck, 1 for listing of P001 input deck.
- (column 18): Punch option - 0 for no punched P001 input deck, 1 for punched P001 input deck.
- (column 19): Plot option - 0 for no scenario plot, 1 for scenario plot.
- (column 20): Extended output option - 0 for no extended output, 1 for extended printout of P001 analysis results.
- (columns 21-30): Jammer power in watts (0 to 1,000 watts).

D. Gun emplacement location cards: If column 16 on the control card contains a 1, six gun location cards specifying the x, y and z coordinates of each of the gun emplacements (format 3F10.0) specified in the order given in the order of battle are required as input data.

E. Sample PIP input deck:



```
// ( Green JOB Card, TIME=2 )
// EXEC NVTECGO,NAME=PIP,REGION=200K
//STEPLIB DD DSN=F0559.PIP,UNIT=3330,VOL=SER=DISK02,DISP=SHR
//FT06F001 DD SYSOUT=A,DCB=(RECFM=FBA,LRECL=133,BLKSIZE=3325)
//GO.FT07F001 DD SYSOUT=B
//GO.SYSIN DD*
0.          500.          450.
500.        500.          440.
900.        600.          445.
(etc., until all milestones are described)
99999.
232.0       2511111111    500.0
14800.      9000.         20.
16200.      8200.         10.
(etc., until all six AAA locations are described)
/*
```

F. When the P001 input deck punched by PIP is received, put the green JOB card used for PIP on top of the deck and an orange /\* (EOF) card on the bottom of the deck and read it through the card reader. The output of this deck will be a combat survivability analysis for the given flight path and AAA emplacement locations.





# APPENDIX B

## PIP INPUT DECK LISTING

THE FOLLOWING IS AN EXAMPLE OF THE INPUT TO THE P001 INPUT PROGRAM (PIP) TO BE RUN FROM A LOAD MODULE (DISK 02). THE INPUT UTILIZES THE PRESET GUN EMPACEMENT LOCATIONS OPTION AND THE ELECTRONIC WARFARE (JAMMING), IES ANTI-JAM AND MULTIPATH SCENARIO OPTIONS. THE CONTROL CARD ALSO SPECIFIES THAT THE OUTPUT BE LISTED, PUNCHED AND PLOTTED. THERE ARE 20 MILESTONES, MILESTCNE 15 IS THE BOMB RELEASE MILESTCNE AND THE CRUISE SPEED IS SPECIFIED AS 232.0 METERS PER SECOND. THE EXTENDED OUTPUT OPTION IS SPECIFIED.

```
// ( GREEN JOB CARD )
// EXEC NVTECGO,NAME=PIP
//STEPLIB DD DSN=F0559.PIP,UNIT=3330,VOL=SER=DISK02,DISP=SHR
//FT06FC01 DD SYSCUT=A,DCB=(RECFM=FBA,LRECL=133,BLKSIZE=3325)
//GO.FTC7F001 DD SYSCUT=B
//GO.SYSIN DD *
0.1386. 457.
2742. 423.
4054. 434.
5406. 374.
6762. 421.
8129. 436.
9508. 380.
10767. 412.
11588. 448.
12054. 455.
12844. 1880.
13525. 2130.
14050. 2120.
14097. 1698.
15127. 914.
16479. 606.
17619. 562.
17881. 474.
17872. 456.
99999. 457.
232.0 1511101111 500.0
/*
```



THE FOLLOWING IS THE OUTPUT FROM THE POOL INPUT PROGRAM (PIP) UTILIZING THE PRESET GUN EMPLACEMENT LOCATIONS AND THE ELECTRONIC WARFARE (JAMMING), ANTI-JAM, MULTIPATH AND EXTENDED OUTPUT OPTIONS:

```

// EXEC PGM=PIEW,REGION=200K
//STEPLIB DD DSN=FO5559.PIEW,UNIT=3330,VOL=SER=DISK02,DISP=SHR
//FT06F01 DD SYSOUT=A,QCB=(RECFM=FBA,LRECL=133,BLKSIZE=3325)
//GO.FT04F01 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),
//CDB=(RECFM=VBS,SYSDA,SPACE=404,BLKSIZE=3236)
//GO.FT07F01 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),
//CDB=(RECFM=VBS,LRECL=434,BLKSIZE=3236)
//GO.FT08F01 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),
//CDB=(RECFM=VBS,LRECL=404,BLKSIZE=3236)
//GO.FT09F01 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),
//CDB=(RECFM=VBS,LRECL=404,BLKSIZE=3236)
//FT11F01 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),
//CDB=(RECFM=VBS,LRECL=404,BLKSIZE=3236)
//GO.FT05F01 DD *

```

01 AIRCRAFT COMBAT SURVIVABILITY SCENARIO

[illegible]

03 /\*GC.FTC5F002 DD \* 14800. 9000. 40.















[illegible]





```

100.000 100.000 100.000 100.000 100.000 100.000
100.000 100.000 100.000 100.000 100.000 100.000
100.000 100.000 100.000 100.000 100.000 100.000
1000.000 1000.000 1000.000 1000.000 1000.000 1000.000
1000.000 1000.000 1000.000 1000.000 1000.000 1000.000
1000.000 1000.000 1000.000 1000.000 1000.000 1000.000
12111111
/*
//GO.FTC5F003 DD *
/*

```

(NEW PAGE)

\*\*\*\*\* POOL FLIGHT PATH SCENARIO SUMMARY \*\*\*\*\*

THE FLIGHT PATH CONSISTS OF 20 MILESTONES WITH A TOTAL FLIGHT TIME OF 114.5 SECONDS. BOMB RELEASE IS AT MILESTONE 15.

\*\*\*\*\* OPTION SUMMARY \*\*\*\*\*

CRUISE SPEED IS 232.0 METERS PER SECOND.  
A POOL INPUT LISTING IS PROVIDED AS OUTPUT.  
A PUNCHED DECK IS PROVIDED AS OUTPUT.  
A SCENARIO PLOT IS PROVIDED AS OUTPUT.  
EXTENDED PRINTOUT IS PROVIDED AS OUTPUT.  
PRESET GUN EMPLOYMENT LOCATIONS ARE UTILIZED.  
AN AIRBORNE JAMMER IS BEING UTILIZED.  
JAMMER POWER IS 500.0 WATTS.  
ANTI-JAM FEATURE IS UTILIZED WHERE APPROPRIATE.  
MULTIPATH RADAR EFFECTS ARE CONSIDERED.

\*\*\*\*\* FLIGHT PATH ERRORS \*\*\*\*\*

\*\*\*\*\* NO FLIGHT PATH ERRORS IN THIS RUN \*\*\*\*\*

\*\*\*\*\* END OF POOL INPUT PROGRAM - SUMMARY COMPLETE \*\*\*\*\*



## APPENDIX D

### P001 INPUT GUIDE CHANGES

#### Revisions to P001:

1. Delete card 7A and 7B.
2. Insert cards 13 and 14 as given on the following pages.
3. The following list is given as an aid to facilitate the assignment of valid combinations of gun type, mode and operating characteristics to the ECM and multipath options:

Gun Type (IGT)	Mode (IEM)	Radar ID (IRECM)	IRMP	Option
1	1	-	-	-
2	1	-	-	-
3	1	-	-	-
3	2	-	-	-
3	3	-	-	-
3	3	1	-	Jam
3	3	1	1	Jam, Multipath
3	4	-	-	-
3	4	1	-	Jam
4	1	-	-	-
5	1	-	-	-
5	2	-	-	-
5	3	-	-	-
5	3	2	-	Jam
5	3	2	2	Jam, Multipath
5	3	3	-	Jam, Anti-jam
5	3	3	2	Jam, Anti-jam, Multipath
5	3	4	-	Jam
5	3	4	3	Jam, Multipath
5	4	-	-	-
5	4	2	-	Jam
5	4	3	-	Jam, Anti-jam
5	4	4	-	Jam





Radar Multipath Input Parameters					CARD: 13																
ID	PARA	UNITS	FORMAT	COLUMNS	DESCRIPTION																
A	I	ND	I2	1-2	Data group identification code. I=13 indicates that the remainder of the card contains radar multipath parameters.																
B	ICARD	ND	7A10,A8	3-80	Seventy-eight columns of alphameric data to be decoded and assigned as follows:																
B1	IMUL	ND	I3	3-5	IMUL=0, no multipath. Turn off multipath if previously used. IMUL=1, multipath desired.																
B2	IRMP	ND	I5	6-10	Radar type ID. Specifies the tracking radar.																
B3	REFC	ND	F10.0	11-20	Reflection coefficient. 0.35 is a typical value for terrain with vegetation.																
NOTE: Multipath effects can only be applied to a system with a Mode ID (IEM) of 3.																					
The value of IRMP selects the appropriate radar parameters:																					
<table><tr><th>IRMP</th><th>Beamwidth (deg)</th><th>Squint Angle (deg)</th><th>Calibration Constant</th></tr><tr><td>1</td><td>1.4</td><td>0.5</td><td>0.759</td></tr><tr><td>2</td><td>1.8</td><td>0.6</td><td>1.06</td></tr><tr><td>3</td><td>4.5</td><td>1.4</td><td>2.74</td></tr></table>						IRMP	Beamwidth (deg)	Squint Angle (deg)	Calibration Constant	1	1.4	0.5	0.759	2	1.8	0.6	1.06	3	4.5	1.4	2.74
IRMP	Beamwidth (deg)	Squint Angle (deg)	Calibration Constant																		
1	1.4	0.5	0.759																		
2	1.8	0.6	1.06																		
3	4.5	1.4	2.74																		



# Radar Multipath Input Parameters

CARD: 13

ID	PARA	UNITS	FORMAT	COLUMNS	DESCRIPTION								
					<p>The following table gives the relationship between the Radar ID (IRECM) and the corresponding radar parameters (IRMP):</p> <table><tr><th><u>Radar ID (IRECM)</u></th><th><u>IRMP</u></th></tr><tr><td>1</td><td>1</td></tr><tr><td>2,3</td><td>2</td></tr><tr><td>4</td><td>3</td></tr></table>	<u>Radar ID (IRECM)</u>	<u>IRMP</u>	1	1	2,3	2	4	3
<u>Radar ID (IRECM)</u>	<u>IRMP</u>												
1	1												
2,3	2												
4	3												

CARD: 13

CARD: 13



## ECM (Jamming) Input Parameters

CARD: 14

ID	PARA	UNITS	FORMAT	COLUMNS	DESCRIPTION
A	I	ND	I2	1-2	Data group identification code. I=14 indicates that the remainder of the card contains ECM parameters.
B	ICARD	ND	7A10,A8	3-80	Seventy-eight columns of alphameric data to be decoded and assigned as follows:
B1	IJAM	ND	I3	3-5	Jamming switch. 0=no jamming; 1=jamming; card must be reread with IJAM=0 to turn jamming off.
B2	IP	ND	I3	6-8	IP=0, no J/S printout. IP=n, print every nth value.
B3	IJ	ND	I2	9-10	IJ=0; then GAINJ is antenna gain of jammer.
B4	GAINJ	ND	F10.0	11-20	IJ=1; a 37x37 5° jammer table follows. Gain is in dB.
B5	PJW	watts	F10.0	21-30	Jammer power in watts.
B6	PLEN	sec	F10.0	31-40	Length of jammer cover pulse. Needed when IRECM=3. 1 microsecond is a standard value.
B7	IX	ND	I5	41-45	IX=0; no cross section table is needed.
B8	XSEC	m <sup>2</sup>	F10.0	46-55	A constant cross section of XSEC m <sup>2</sup> is used.
B9	CALX	ND	F10.0	56-65	IX=1, a cross section table will be read following the 14 card and a possible jammer table. The cross section table values will be multiplied by CALX. This allows the user to scale the cross section. If not used, it must be set to 1.

CARD: 14





ECM (Jamming) Input Parameters					CARD: 14																				
ID	PARA	UNITS	FORMAT	COLUMNS	DESCRIPTION																				
B10	IRECM	ND	I5	66-70	<p>Radar type. This index calls up the following constants from a data statement:</p> <table><thead><tr><th><u>IRECM</u></th><th><u>Gain (RGDB)</u></th><th><u>Power (PRW)</u></th><th><u>Frequency (FREQ)</u></th><th><u>SJTMAX*</u></th></tr></thead><tbody><tr><td>1</td><td>40.0 dB</td><td>150,000</td><td>15.1E9</td><td>3 dB</td></tr><tr><td>2,3</td><td>38.5 dB</td><td>175,000</td><td>9.38E9</td><td>1.5, 17 dB</td></tr><tr><td>4</td><td>28.0 dB</td><td>250,000</td><td>2.838E9</td><td>0 dB</td></tr></tbody></table>	<u>IRECM</u>	<u>Gain (RGDB)</u>	<u>Power (PRW)</u>	<u>Frequency (FREQ)</u>	<u>SJTMAX*</u>	1	40.0 dB	150,000	15.1E9	3 dB	2,3	38.5 dB	175,000	9.38E9	1.5, 17 dB	4	28.0 dB	250,000	2.838E9	0 dB
<u>IRECM</u>	<u>Gain (RGDB)</u>	<u>Power (PRW)</u>	<u>Frequency (FREQ)</u>	<u>SJTMAX*</u>																					
1	40.0 dB	150,000	15.1E9	3 dB																					
2,3	38.5 dB	175,000	9.38E9	1.5, 17 dB																					
4	28.0 dB	250,000	2.838E9	0 dB																					
B11	SJTMAX	dB	F10.0	71-80	<p>*SJTMAX must be entered as in B11. Threshold where tracking errors become significant. (dB)</p> <p>NOTE: The following table summarizes the valid combinations of radars, gun types and tracking modes:</p> <table><thead><tr><th><u>Radar ID (IRECM)</u></th><th><u>Gun ID (IGT)</u></th><th><u>Mode ID (IEM)</u></th></tr></thead><tbody><tr><td>1</td><td>3</td><td>3,4</td></tr><tr><td>2,3</td><td>5</td><td>3,4</td></tr><tr><td>4</td><td>5</td><td>3,4</td></tr></tbody></table> <p>The two ID's on the second radar indicate the anti-jam capability.</p> <p>IRECM = 2, anti-jam off</p> <p>IRECM = 3, anti-jam on</p>	<u>Radar ID (IRECM)</u>	<u>Gun ID (IGT)</u>	<u>Mode ID (IEM)</u>	1	3	3,4	2,3	5	3,4	4	5	3,4								
<u>Radar ID (IRECM)</u>	<u>Gun ID (IGT)</u>	<u>Mode ID (IEM)</u>																							
1	3	3,4																							
2,3	5	3,4																							
4	5	3,4																							



## APPENDIX E

### JCL CARD SETUPS FOR REFERENCES

THE FOLLOWING CARDS ARE THE SETUP TO RUN THE POOL INPUT PROGRAM (PIP)  
FROM BATCH, UTILIZING THE CALCOMP PLOTTER:

```
// ( GREEN JOB CARD )
// EXEC FORTCLGP
// FORT.F01 DD SYSCUT=B
// FORT.SYSIN DD *
// ( PROGRAM SOURCE CARDS GO HERE )
/*GO.SYSIN DD *
// ( DATA DECK GOES HERE )
/*
```



THE FOLLOWING CARDS ARE THE SETUP TO RUN THE POOL INPUT PROGRAM (PIP)  
FROM BATCH, UTILIZING THE VERSATEC PLOTTER:

```
// ( GREEN JOB CARD )
// EXEC FORTCLGV
//FCRT.SYSIN DD *
// ( PROGRAM SOURCE CARDS GO HERE )
/*
//GC.FTCT7F001 DD SYSOUT=B
//GO.SYSIN DD *
// ( DATA DECK GOES HERE )
/*
```





THE FOLLOWING CARCS ARE THE SETUP TO CREATE A LOAD MODULE FOR THE PC01  
INPUT PROGRAM (PIP):

```
// ( GREEN JOB CARD )
// EXEC NVTECLNK
//FCRT.SYSIN DD *
// ( PROGRAM SOURCE CARDS GO HERE )
/*
//LINK.SYSLMOD DD DSN=F0559.PIP,SPACE=(CYL,(2,1,1)),
// UNIT=3330,VOL=SER=DISK02,DISP=(NEW,KEEP),
// LABEL=EXPDT=99360
//LINK.SYSIN DD *
ENTRY MAIN
NAME PIP(R)
/*
```



THE FOLLOWING CARDS ARE THE SETUP TO RUN THE POOL INPUT PROGRAM (PIP)  
FROM A LOAD MODULE, UTILIZING THE VERSATEC PLOTTER.

```
// ( GREEN JOB CARD )  
// EXEC NVTEC GO, NAME=PIP, REGION=200K  
// STEPLIB DD DSN=F0559.PIP, UNIT=3330, VOL=SER=DISK02, DISP=SHR  
// F106F001 DD SYSOUT=A, DCB=(RECFM=FBA, LRECL=133, BLKSIZE=3325)  
// GO.FTCT7F001 DD SYSOUT=B  
// GO.SYSIN DD *  
// ( DATA DECK GOES HERE )  
/*
```



THE FOLLOWING CARDS ARE THE SETUP TO REMOVE THE PC01 INPUT PROGRAM  
(PIP) FROM DISK 02:

```

// JOB CARD )
// SCRATCH EXEC PGM=IEHPRGM
// SYSPRINT DD SYSCUT=A
// DD1 DD UNIT=3330,VOL=SER=DISK02,DISP=CLD
// SYSPRINT DD *
// SCRATCH DSN=IEHPRGM.DAT,DISP=DELETE
/*
```



THE FOLLOWING CARDS ARE THE SETUP TO RUN THE IMPRCVD P001 AAA SIMULATION  
PROGRAM (PIEW) FROM BATCH:

```
// ( GREEN JOB CARD )
// EXEC FORTCLG,REGICN.GO=250K
//FORT.SYSIN DD *
// ( PROGRAM SOURCE CARDS GO HERE )
/*
//GO.FTC4F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),
// DCB=(RECFM=VBS,LRECL=404,BLKSIZE=3236)
//GO.FTC7F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),
// DCB=(RECFM=VBS,LRECL=404,BLKSIZE=3236)
//GO.FTC8F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),
// DCB=(RECFM=VBS,LRECL=404,BLKSIZE=3236)
//GO.FTC9F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),
// DCB=(RECFM=VBS,LRECL=404,BLKSIZE=3236)
//GO.FT11F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),
// DCB=(RECFM=VBS,LRECL=404,BLKSIZE=3236)
//GO.FTC5F001 DD *
// ( DATA DECK GOES HERE )
/*
```





THE FOLLOWING CARDS ARE THE SETUP TO CREATE A LOAD MODULE FOR THE  
IMPROVED POOL AAA SIMULATION PROGRAM (PIEW):

```
// ( GREEN JOB CARD )
// EXEC FORTCL
// FORT.SYSIN DD *
// ( PROGRAM SOURCE CARDS GO HERE )
/*
// LINK.SYSLMOD DD DSN=F0559.PIW,SPACE=(CYL,(2,1,1)),
// UNIT=3330,VOL=SER=DISK02,DISP=(NEW,KEEP),
// LABEL=EXPDT=99360
// LINK.SYSIN DD *
// ENTRY MAIN
// NAME PIEW(R)
/*
```



THE FOLLOWING CARDS ARE THE SETUP TO RUN THE IMPRCVD P001 AAA SIMULATION  
PROGRAM (PIEW) FROM A LOAD MODULE:

```
// ( GREEN JOB CARD )
// EXEC PGM=PIEW,REGION=200K
//STEPLIB DD DSN=F0559.PIEW,UNIT=3330,VCL=SER=DISK02,DISP=SHR
//FT06FC01 DD SYSCUT=A,DCB=(RECFM=FBA,LRECL=133,BLKSIZE=3325)
//GO.FT04F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),
//DCB=(RECFM=VBS,LRECL=404,BLKSIZE=3236)
//GO.FT07F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),
//DCB=(RECFM=VBS,LRECL=404,BLKSIZE=3236)
//GO.FT08F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),
//DCB=(RECFM=VBS,LRECL=404,BLKSIZE=3236)
//GO.FT09F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),
//DCB=(RECFM=VBS,LRECL=404,BLKSIZE=3236)
//GO.FT11F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),
//DCB=(RECFM=VBS,LRECL=404,BLKSIZE=3236)
//GC.FT05F001 DD
// ( DATA DECK GOES HERE )
/*
```



THE FOLLOWING CARDS ARE THE SETUP TO REMCVE P1EW FROM DISK 02:

```
//( JOB CARD )
//SCRATCH EXEC PGM=IEHPRGM
//SYSPRINT DD SYSCUT=A
//DCL DD UNIT=3330,VOL=SER=DISK02,DISP=CLD
//SYSIN DD *
SCRATCH DSN=DSNAME=F0559.P1EW,VOL=3330=DISK02,PURGE
/*
```





APPENDIX F  
P001 ANALYSIS OUTPUT

MASK ANGLE FOR THIS RUN = 0.0 DEG.



[illegible]



TIME	XXX	YYY	ZZZ	SPEED	XDOT	YDOT	ZDOT	HEADING	CLIMB	PAGE
74-33	1375533	7	19257	30	50.26	172.59	42.25	64.00	2.00	37.75
75-08	1375533	7	18470	32	49.19	173.59	42.25	64.00	2.00	37.75
76-08	1375533	7	17623	35	47.01	175.81	42.25	64.00	2.00	37.75
79-03	1140703	1	15124	46	45.12	172.60	42.25	64.00	2.00	37.75
81-58	1140703	1	13644	15	43.22	150.74	42.25	64.00	2.00	37.75
83-54	1140703	1	11008	85	41.77	122.44	42.25	64.00	2.00	37.75
85-34	1140703	1	9471	20	40.23	104.62	42.25	64.00	2.00	37.75
86-09	1140703	1	7711	10	38.77	82.47	42.25	64.00	2.00	37.75
89-04	1140703	1	6255	59	37.00	61.17	42.25	64.00	2.00	37.75
92-00	1140703	1	5592	31	35.02	40.50	42.25	64.00	2.00	37.75
93-97	1140703	1	5592	31	33.57	20.71	42.25	64.00	2.00	37.75
94-35	1140703	1	5592	31	32.00	0.00	42.25	64.00	2.00	37.75
95-72	1140703	1	5592	31	30.50	-20.71	42.25	64.00	2.00	37.75
97-10	1140703	1	5592	31	29.00	-40.50	42.25	64.00	2.00	37.75
101-03	1140703	1	5592	31	27.50	-60.71	42.25	64.00	2.00	37.75
103-23	1140703	1	5592	31	26.00	-80.50	42.25	64.00	2.00	37.75
105-58	1140703	1	5592	31	24.50	-100.71	42.25	64.00	2.00	37.75
107-36	1140703	1	5592	31	23.00	-120.50	42.25	64.00	2.00	37.75
109-71	1140703	1	5592	31	21.50	-140.71	42.25	64.00	2.00	37.75
111-49	1140703	1	5592	31	20.00	-160.50	42.25	64.00	2.00	37.75
113-86	1140703	1	5592	31	18.50	-180.71	42.25	64.00	2.00	37.75
115-24	1140703	1	5592	31	17.00	-200.50	42.25	64.00	2.00	37.75

XR= 0.0 YR= 0.0 XI= 0.0 YI= 0.0 PZ= 0.0 CZ= 0.0





[illegible]









## ECM INPUTS (INITIAL OR CHANGED)

IP = 5  
IJ = 0  
GAINJ(DB) = 1.00  
PJM(M) = 500.00  
PLEN(S) = 0.0  
IX = 1  
XSEC(SOH) = 0.0  
CALX = 1.00  
IRECM = 1  
SJTNA(DB) = 3.00

JAMMER ANTENNA GAIN 1.000 DB

AIRCRAFT CROSS SECTION TABLE SPECIFIED. PRINTED VALUES WILL BE MULTIPLIED BY CALX. CALX= 1.00



TABLE DATA

19 ELEMENTS FROM  
7 ELEMENTS FROM  
ELSEWHERE TABLE IS

0.0 IC 100.00 EV 10.00 AZ  
-50.00 IC 50.00 EV 30.00 EL  
1000.00





BGS MATRIX

	0	10	20	30	40	50	60	70	80	90	100	110	120
-120.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-90.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-60.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-30.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
0.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
30.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
60.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
90.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
120.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00



REF MATRIX	130	140	150	160	170	180
-120.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-30.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-30.0	0.07	0.07	0.07	0.07	0.07	0.07
30.0	0.07	0.07	0.07	0.07	0.07	0.07
30.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
120.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00



## VULNERABLE AREA (SQ METERS) AS A FUNCTION OF IMPACT SPEED (METERS/SEC) AND ASPECT VIEW

VIEW	0	152	305	457	510	762	914	1067	1219
1	0.00	12.54	12.54	13.47	13.47	13.47	13.47	13.47	13.47
2	0.00	12.54	12.54	13.47	13.47	13.47	13.47	13.47	13.47
3	0.00	12.54	12.54	13.47	13.47	13.47	13.47	13.47	13.47
4	0.00	12.54	12.54	13.47	13.47	13.47	13.47	13.47	13.47
5	0.00	12.54	12.54	13.47	13.47	13.47	13.47	13.47	13.47
6	0.00	12.54	12.54	13.47	13.47	13.47	13.47	13.47	13.47
7	0.00	12.54	12.54	13.47	13.47	13.47	13.47	13.47	13.47
8	0.00	12.54	12.54	13.47	13.47	13.47	13.47	13.47	13.47
9	0.00	12.54	12.54	13.47	13.47	13.47	13.47	13.47	13.47
10	0.00	12.54	12.54	13.47	13.47	13.47	13.47	13.47	13.47
11	0.00	12.54	12.54	13.47	13.47	13.47	13.47	13.47	13.47
12	0.00	12.54	12.54	13.47	13.47	13.47	13.47	13.47	13.47
13	0.00	12.54	12.54	13.47	13.47	13.47	13.47	13.47	13.47
14	0.00	12.54	12.54	13.47	13.47	13.47	13.47	13.47	13.47
15	0.00	12.54	12.54	13.47	13.47	13.47	13.47	13.47	13.47
16	0.00	12.54	12.54	13.47	13.47	13.47	13.47	13.47	13.47
17	0.00	12.54	12.54	13.47	13.47	13.47	13.47	13.47	13.47
18	0.00	12.54	12.54	13.47	13.47	13.47	13.47	13.47	13.47
19	0.00	12.54	12.54	13.47	13.47	13.47	13.47	13.47	13.47
20	0.00	12.54	12.54	13.47	13.47	13.47	13.47	13.47	13.47
21	0.00	12.54	12.54	13.47	13.47	13.47	13.47	13.47	13.47
22	0.00	12.54	12.54	13.47	13.47	13.47	13.47	13.47	13.47
23	0.00	12.54	12.54	13.47	13.47	13.47	13.47	13.47	13.47
24	0.00	12.54	12.54	13.47	13.47	13.47	13.47	13.47	13.47
25	0.00	12.54	12.54	13.47	13.47	13.47	13.47	13.47	13.47
26	0.00	12.54	12.54	13.47	13.47	13.47	13.47	13.47	13.47



MULTIPATH INPUTS (INITIAL OR CHANGED)

INMP = 1  
REFC = 0.350





## MULTIPATH INPUTS (INITIAL OR CHANGED)

IRMP = 2  
REFC = 0.350

## ECM INPUTS (INITIAL OR CHANGED)

IP = 5  
IU = 3  
GAINJ(DB) = 1.00  
PIL(W) = 500.00  
PLEN(S) = 0.0  
IX = 1  
ASEC(SCN) = 0.0  
CALX = 1.000  
IRECM = 1  
SUTMAX(DB) = 17.00

JAMMER ANTENNA GAIN 1.000 DB

AIRCRAFT CROSS SECTION TABLE SPECIFIED. PRINTED VALUES WILL BE MULTIPLIED BY CALX. CALX = 1.00



TABLE DATA

19 ELEMENTS FROM  
17 ELEMENTS FROM  
ELSEWHERE TABLE IS

0.0 YC 10.00 PY 10.00 AZ  
50.00 10 90.00 PY 30.00 EL  
100.00



BCEV MATRIX										
	0	10	20	30	40	50	60	70	80	90
-120.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-90.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-60.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-30.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
0.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
30.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
60.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
90.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
120.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00





REGV MATRIX											
130	1000.00	143	1000.00	150	1000.00	160	1000.00	170	1000.00	180	1000.00
130.0	1000.00	143.0	1000.00	150.0	1000.00	160.0	1000.00	170.0	1000.00	180.0	1000.00
-130.0	1000.00	143.0	1000.00	150.0	1000.00	160.0	1000.00	170.0	1000.00	180.0	1000.00
-140.0	1000.00	143.0	1000.00	150.0	1000.00	160.0	1000.00	170.0	1000.00	180.0	1000.00
-150.0	1000.00	143.0	1000.00	150.0	1000.00	160.0	1000.00	170.0	1000.00	180.0	1000.00
30.0	1000.00	143.0	1000.00	150.0	1000.00	160.0	1000.00	170.0	1000.00	180.0	1000.00
30.0	1000.00	143.0	1000.00	150.0	1000.00	160.0	1000.00	170.0	1000.00	180.0	1000.00
30.0	1000.00	143.0	1000.00	150.0	1000.00	160.0	1000.00	170.0	1000.00	180.0	1000.00
30.0	1000.00	143.0	1000.00	150.0	1000.00	160.0	1000.00	170.0	1000.00	180.0	1000.00
120.0	1000.00	143.0	1000.00	150.0	1000.00	160.0	1000.00	170.0	1000.00	180.0	1000.00



VULNERABLE AREA (SQ. METERS) AS A FUNCTION OF IMPACT SPEED (METERS/SEC) AND ASPECT VIEW  
CULNERABLE AREA TABLE VS TYPE 5 WEAPON

VIEW	0	152	305	457	610	762	914	1067	1219
1	0.00	53.37	53.37	53.37	53.37	53.37	53.37	53.37	53.37
2	0.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00
3	0.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00
4	0.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00
5	0.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00
6	0.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00
7	0.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00
8	0.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00
9	0.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00
10	0.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00
11	0.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00
12	0.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00
13	0.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00
14	0.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00
15	0.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00
16	0.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00
17	0.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00
18	0.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00
19	0.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00
20	0.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00
21	0.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00
22	0.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00
23	0.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00
24	0.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00
25	0.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00



LOC	PKILL	ROUNDS	FIRE TIME	XCUN	YGUN	ZGUN	RADIUS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
1	0.0010946	17	5.25	14800.00	9000.00	40.00	0.0	1	1	1	1	1	1	1	1	1	1	1
2	0.0003691	17	6.80	12200.00	8200.00	40.00	0.0	1	1	1	1	1	1	1	1	1	1	1
3	0.0	0	0.0	13400.00	7200.00	20.00	0.0	1	1	1	1	1	1	1	1	1	1	1
4	0.0	0	0.0	13400.00	8200.00	20.00	0.0	1	1	1	1	1	1	1	1	1	1	1
5	0.0	0	0.0	11300.00	8700.00	20.00	0.0	1	1	1	1	1	1	1	1	1	1	1
6	0.0112059	422	21.10	14600.00	10900.00	20.00	0.0	1	1	1	1	1	1	1	1	1	1	1
7	0.0684375	134	57.42	12800.00	7500.00	20.00	0.0	1	1	1	1	1	1	1	1	1	1	1

## ATTRITION ACCRUED AS A FUNCTION OF TIME OF FIRE

TIME SEG.	CUM FOR CLASS 1	DENSITY CLASS 1	DENSITY CLASS 2	DENSITY CLASS 3	DENSITY CLASS 4	DENSITY CLASS 5	DENSITY CLASS 6	DENSITY CLASS 7	DENSITY CLASS 8	DENSITY CLASS 9
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0024045	0.0024045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0025303	0.0025303	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0220605	0.0153878	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.0653287	0.0483268	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.0766286	0.0073437	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	0.0802163	0.0038855	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0802163	0.0038855	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## ATTRITION ACCRUED AS A FUNCTION OF TIME AT INTERCEPT

TIME SEG.	CUM FOR CLASS 1	DENSITY CLASS 1	DENSITY CLASS 2	DENSITY CLASS 3	DENSITY CLASS 4	DENSITY CLASS 5	DENSITY CLASS 6	DENSITY CLASS 7	DENSITY CLASS 8	DENSITY CLASS 9
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0025023	0.0025023	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.0191057	0.016461	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.0676150	0.049522	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	0.0760475	0.0050451	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0802164	0.0045121	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTALS	0.0802243	0.0802243	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## TOTAL PK FOR DENSITY CLASS 1 AS A FUNCTION OF ASPECT SECTOR AND IMPACT SPEED.

SECTOR	AZIMUTH REAR=00	ELEV. DOWN=00	0-152	152-305	305-457	457-610	610-762	762-914	914-1067	1067-1219	TOTAL PK
1	000-045	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	045-090	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	090-135	000-045	0.0	0.0	0.0	0.0	0.0001340	0.0	0.0	0.0	0.0001340





## TOTAL PK FOR DENSITY CLASS 1 AS A FUNCTION OF ASPECT SECTOR AND IMPACT SPEED.

SECTOR	ALTIMUTH REAR=00	ELEV. CCMN=CC	0-152	152-305	305-457	457-610	610-762	762-914	914-1067	1067-1219	TOTAL PK
4	135-160	000-045	0.0	0.0003255	0.0	0.0	0.0002519	0.0	0.0	0.0	0.0002519
5	160-225	000-045	0.0	0.0	0.0012023	0.0	0.0	0.0	0.0	0.0	0.0012023
6	225-270	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	270-315	000-045	0.0	0.0000411	0.0	0.0	0.0	0.0	0.0	0.0	0.0000411
8	315-360	000-045	0.0001108	0.0001518	0.0	0.0	0.0	0.0	0.0	0.0	0.0002626
9	000-045	045-090	0.0	0.0003374	0.0	0.0	0.0	0.0	0.0	0.0	0.0003374
10	045-090	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	090-135	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	135-180	045-090	0.0	0.0	0.0058241	0.0025407	0.0037085	0.0	0.0	0.0	0.0073083
13	180-225	045-090	0.0	0.0036015	0.0002853	0.0	0.0167664	0.0030211	0.0	0.0	0.0276221
14	225-270	045-090	0.0	0.0	0.0000298	0.0	0.0003593	0.0	0.0	0.0	0.0003891
15	270-315	045-090	0.0	0.0006235	0.0002650	0.0	0.0	0.0	0.0	0.0	0.0008885
16	315-360	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	000-045	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	045-090	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	090-135	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	135-180	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	180-225	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	225-270	090-135	0.0	0.0	0.0	0.0054171	0.0001863	0.00392844	0.0	0.0	0.0054171
23	270-315	090-135	0.0	0.0	0.0	0.0	0.0	0.01750	0.0	0.0	0.0017500
24	315-360	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	000-045	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	045-090	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	090-135	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	135-180	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	180-225	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	225-270	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	270-315	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	315-360	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTALS			0.0001168	0.0047761	0.0075947	0.0075440	0.0180647	0.0438568	0.0	0.0	0.0992164

\*\*\*\*\* END OF JCB - - PC01 SCENARIO RUN COMPLETE \*\*\*\*\*





APPENDIX G

P001 ANALYSIS EXTENDED OUTPUT

MASK ANGLE FOR THIS RUN = 0.0 DEG.



[illegible]





AFATL P-001-AAASIN " AIRCRAFT-COMBAT-SURVIVABILITY-SCENARIO

TIME	XXX	YYY	ZZZ	SPEED	XOCT	YOINT	ZOCT	HEADING	CLIMB	ROLL
74.33	13756.5	4782.7	1935.7	212.30	90.36	172.56	-80.42	64.45	-22.28	75
75.08	13863.5	5029.9	1899.0	214.33	84.19	173.43	-89.99	64.45	-22.66	75
77.45	13970.3	5277.1	1762.9	216.36	77.15	175.43	-97.99	64.45	-22.96	75
79.83	14081.1	5828.4	1512.3	218.46	57.12	178.81	-101.99	64.45	-23.95	75
81.21	14081.0	6038.8	1316.4	220.81	45.26	187.79	-102.42	64.45	-23.95	75
82.00	14078.5	6338.2	1216.8	223.50	32.80	196.74	-82.42	64.45	-23.95	75
83.00	14080.6	6539.6	1020.8	225.95	20.37	205.71	-72.42	64.45	-23.95	75
85.34	14330.2	7166.7	847.1	230.20	7.11	220.67	-53.05	64.45	-23.95	75
86.71	14419.5	7468.7	771.2	231.75	48.61	226.72	-42.23	64.45	-23.95	75
89.47	14503.5	7687.7	698.0	233.88	172.56	168.72	-31.53	64.45	-23.95	75
92.22	15033.5	8002.2	590.9	233.88	172.56	139.62	-20.57	64.45	-23.95	75
93.97	15337.6	8159.8	540.9	233.88	172.56	132.54	-9.17	64.45	-23.95	75
96.55	16111.5	8345.8	511.3	233.88	205.50	118.70	-7.17	64.45	-23.95	75
97.22	16477.5	8677.8	545.8	233.88	205.50	119.71	-9.17	64.45	-23.95	75
99.48	16998.5	9035.8	555.7	233.88	193.30	129.33	-12.42	64.45	-23.95	75
101.00	17176.3	9235.8	555.7	233.88	193.30	129.33	-12.42	64.45	-23.95	75
103.41	17767.3	9508.8	555.7	233.88	193.30	129.33	-12.42	64.45	-23.95	75
105.90	17775.3	9508.8	555.7	233.88	193.30	129.33	-12.42	64.45	-23.95	75
107.71	17775.3	9508.8	555.7	233.88	193.30	129.33	-12.42	64.45	-23.95	75
109.71	17775.3	9508.8	555.7	233.88	193.30	129.33	-12.42	64.45	-23.95	75
111.79	17775.3	9508.8	555.7	233.88	193.30	129.33	-12.42	64.45	-23.95	75
112.79	17775.3	9508.8	555.7	233.88	193.30	129.33	-12.42	64.45	-23.95	75
114.24	17775.3	9508.8	555.7	233.88	193.30	129.33	-12.42	64.45	-23.95	75

XR= 0.0 YR= 0.0 XT= 0.0 YT= 0.0 PSI= 0.0 DZ= 0.0





A	B	C	D	E	F	G	H	I	J	K	L
Z	=	2500.0	M								
Z	=	2250.0	M								
Z	=	2000.0	M								
Z	=	1750.0	M								
Z	=	1500.0	M								
Z	=	1250.0	M								
Z	=	1000.0	M								
Z	=	750.0	M								
Z	=	500.0	M								
Z	=	250.0	M								
Z	=	0.0	M								
Y	=	11894.0	M								
Y	=	11483.8	M								
Y	=	11073.7	M								
Y	=	10663.6	M								
Y	=	10253.4	M								
Y	=	9843.3	M								
Y	=	9433.2	M								
Y	=	9023.0	M								
Y	=	8612.9	M								
Y	=	8202.8	M								
Y	=	7792.6	M								
Y	=	7382.5	M								
Y	=	6972.3	M								
Y	=	6562.2	M								
Y	=	6152.1	M								
Y	=	5741.9	M								
Y	=	5331.8	M								
Y	=	4921.6	M								
Y	=	4511.5	M								
Y	=	4101.4	M								
Y	=	3691.2	M								
Y	=	3281.1	M								
Y	=	2871.0	M								
Y	=	2460.8	M								
Y	=	2050.7	M								
Y	=	1640.6	M								
Y	=	1230.4	M								
Y	=	820.3	M								
Y	=	410.1	M								
Y	=	0.0	M								
X(G)	=	9758.9	M								
OV	=	205.1	M								









LOCATION 1 GUN TYPE 1 ERROR MODE 1 POSITION=(14800.0, 9000.0, 40.0) RADIUS= 0.0 M  
 L N DEM FIRE FLT: INTCP FIRE INTCP CLOSE AZIM: ELEV: MEAN MEAN VULN  
 TIME TIME RANGE RANGE RANGE VEL. RATE RATE AREA AREA SHOT PK CUM.PK

PK AS A FUNCTION OF ASPECT SECTOR AND IMPACT SPEED. LOC 1 GT 1 EM 1 X 14800. Y 5000. Z 40. RADIUS 0.0

SECTOR	AZIMUTH	ELEV.	REAR=00	0-152	152-305	305-457	457-610	610-762	762-914	914-1067	1067-1219	TOTAL PK
1	000-045	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	045-090	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	090-135	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	135-180	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	180-225	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	225-270	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	270-315	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	315-360	000-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	000-045	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	045-090	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	090-135	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	135-180	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	180-225	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	225-270	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	270-315	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	315-360	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	000-045	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	045-090	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	090-135	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	135-180	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	180-225	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	225-270	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	270-315	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	315-360	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	000-045	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	045-090	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	090-135	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	135-180	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	180-225	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	225-270	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	270-315	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	315-360	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTALS			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0



## AFATL P-001 AAASIM - AIRCRAFT COMBAT SURVIVABILITY SCENARIO

LOCATION	2	GUN TYPE	1	ERROR	MODE	1	POSITION	1	16200.0,	8200.0,	40.0	RADIUS	0.0	M							
L	N	DEM	FIRE TIME	INTCP TIME	FIRE RANGE	INTCP RANGE	SIGL	SIG2	BIAS1	BIAS2	CLOSE VEL.	ATM RATE	ELEV RATE	MEAN AZ.FRR	MEAN EL.ERM	VULN AREA	SHOT PK	CUM.PK			
1	1	1	91.00	1.59	1342.	1013.	64.6	48.8	104.7	31.8	666.0	-2.49	2.07	0.05	-0.17	3.63	0.00004	0.00004			
1	1	1	91.77	1.37	1174.	907.	55.2	45.6	89.7	19.7	698.4	-0.45	5.86	0.55	0.15	3.92	0.00006	0.00010			
1	1	1	92.54	1.18	1023.	804.	49.0	42.7	69.2	16.1	725.4	-1.97	6.77	0.60	0.24	4.31	0.00011	0.00021			
1	1	1	93.31	1.01	877.	708.	46.8	40.1	53.4	11.7	744.2	-3.38	8.88	0.74	0.35	4.78	0.00020	0.00041			
1	1	1	94.01	0.87	94.89	753.	32.1	38.4	42.9	5.6	748.9	-6.29	11.87	1.08	0.47	5.26	0.00029	0.00071			
1	1	1	94.78	0.77	95.55	643.	82.1	31.6	37.6	9.5	730.2	-16.29	16.35	2.07	0.50	5.63	0.00025	0.00096			
1	1	1	95.55	0.73	96.28	568.	115.7	30.9	13.0	37.5	675.6	-30.00	21.15	2.58	-0.38	6.32	0.00013	0.00109			
PK AS A FUNCTION OF ASPECT, SECTOR AND IMPACT SPEED.																					
LOC 2 - GT-1 - EM-1 - X 16200. - Y 8200. - Z 40. - RADIUS 0.0																					
SECTION	AZIMUTH		ELEV.		0-152		152-305		305-457		457-610		610-762		762-914		914-1067		1067-1219		TOTAL PK
1	000-045		000-045		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
2	045-090		000-045		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
3	090-135		000-045		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
4	135-180		000-045		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
5	180-225		000-045		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
6	225-270		000-045		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
7	270-315		000-045		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
8	315-360		000-045		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
9	000-045		045-090		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
10	045-090		045-090		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
11	090-135		045-090		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
12	135-180		045-090		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
13	180-225		045-090		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
14	225-270		045-090		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
15	270-315		045-090		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
16	315-360		045-090		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
17	000-045		090-135		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
18	045-090		090-135		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
19	090-135		090-135		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
20	135-180		090-135		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
21	180-225		090-135		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
22	225-270		090-135		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
23	270-315		090-135		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
24	315-360		090-135		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
25	000-045		135-180		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
26	045-090		135-180		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
27	090-135		135-180		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
28	135-180		135-180		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
29	180-225		135-180		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
30	225-270		135-180		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
31	270-315		135-180		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
32	315-360		135-180		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
33	000-045		180-225		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
34	045-090		180-225		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
35	090-135		180-225		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
36	135-180		180-225		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
37	180-225		180-225		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
38	225-270		180-225		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
39	270-315		180-225		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
40	315-360		180-225		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
41	000-045		225-270		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
42	045-090		225-270		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
43	090-135		225-270		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
44	135-180		225-270		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
45	180-225		225-270		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
46	225-270		225-270		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
47	270-315		225-270		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
48	315-360		225-270		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
49	000-045		270-315		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
50	045-090		270-315		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
51	090-135		270-315		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
52	135-180		270-315		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
53	180-225		270-315		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
54	225-270		270-315		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
55	270-315		270-315		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
56	315-360		270-315		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
57	000-045		315-360		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
58	045-090		315-360		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
59	090-135		315-360		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
60	135-180		315-360		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
61	180-225		315-360		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
62	225-270		315-360		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
63	270-315		315-360		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
64	315-360		315-360		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
65	000-045		360-000		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
66	045-090		360-000		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
67	090-135		360-000		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
68	135-180		360-000		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
69	180-225		360-000		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
70	225-270		360-000		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
71	270-315		360-000		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
72	315-360		360-000		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
73	000-045		000-045		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
74	045-090		000-045		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
75	090-135		000-045		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
76	135-180		000-045		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
77	180-225		000-045		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
78	225-270		000-045		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		





LOCATION	3	GUN TYPE 2	ERRR MODE 1	POSITION=( 13600.0, 7200.0, 20.0)	RADIUS= 0.0 M	20.0)	MEAN EL.ERR	MEAN AREA	SHOT PK	CUM.PK								
L	N	DEM	FIRE TIME	INTCP TIME	FIRE RANGE	INTCP RANGE	SIG1	SIG2	BIAS1	BIAS2	CLOSE VEL.	AZIM RATE	ELEV RATE	AZ.ERR	MEAN EL.ERR	MEAN AREA	SHOT PK	CUM.PK
1	1	1	80.94	82.13	1651	1432	137.4	57.4	78.7	17.0	606.0	3.77	1.04	-0.52	0.0003	3.22	0.0003	0.00003
1	1	1	81.72	83.08	1775	1383	132.3	55.3	77.1	19.4	616.3	4.24	2.22	-0.58	0.0003	3.17	0.0003	0.00003
1	1	1	82.55	84.30	1623	1285	123.1	54.3	76.5	14.5	635.9	5.44	2.22	-0.60	0.0004	3.11	0.0004	0.00012
1	1	1	83.32	85.05	1467	1181	114.7	52.9	75.9	1.5	654.2	7.33	2.22	-0.75	0.0004	3.06	0.0004	0.00020
1	1	1	84.15	85.81	1332	1070	101.5	50.1	75.1	0.5	661.7	8.46	2.22	-0.89	0.0005	2.98	0.0005	0.00025
1	1	1	84.92	86.40	1125	1061	98.2	47.5	74.5	0.2	662.2	9.77	2.22	-0.95	0.0005	2.93	0.0005	0.00030
1	1	1	85.75	87.36	1127	1087	93.5	46.6	73.5	0.2	639.2	11.65	2.22	-1.17	0.0005	2.85	0.0005	0.00037
1	1	1	86.52	88.09	1065	1117	87.5	44.7	72.5	0.4	580.3	13.50	2.22	-1.41	0.0005	2.74	0.0005	0.00037
1	1	1	87.35	88.83	1079	1205	87.5	42.3	71.5	0.4	505.0	15.52	2.22	-1.55	0.0005	2.65	0.0005	0.00037
1	1	1	88.18	89.54	1115	1266	77.5	40.3	70.5	0.4	412.2	17.62	2.22	-1.70	0.0005	2.50	0.0005	0.00037
1	1	1	88.95	90.25	1150	1437	71.2	38.3	69.5	0.1	352.8	19.62	2.22	-1.90	0.0005	2.35	0.0005	0.00037
1	1	1	89.78	90.96	1180	1537	61.2	36.3	68.5	0.1	222.2	21.62	2.22	-2.10	0.0005	2.20	0.0005	0.00037
1	1	1	90.61	91.67	1215	1637	51.2	34.3	67.5	0.1	102.2	23.62	2.22	-2.30	0.0005	2.05	0.0005	0.00037
1	1	1	91.44	92.42	1250	1737	41.2	32.3	66.5	0.1	0.0	25.62	2.22	-2.50	0.0005	1.90	0.0005	0.00037
1	1	1	92.27	93.17	1285	1837	31.2	30.3	65.5	0.1	0.0	27.62	2.22	-2.70	0.0005	1.75	0.0005	0.00037
1	1	1	93.10	93.92	1320	1937	21.2	28.3	64.5	0.1	0.0	29.62	2.22	-2.90	0.0005	1.60	0.0005	0.00037
1	1	1	93.93	94.67	1355	2037	11.2	26.3	63.5	0.1	0.0	31.62	2.22	-3.10	0.0005	1.45	0.0005	0.00037
1	1	1	94.76	95.42	1390	2137	1.2	24.3	62.5	0.1	0.0	33.62	2.22	-3.30	0.0005	1.30	0.0005	0.00037
1	1	1	95.59	96.17	1425	2237	0.2	22.3	61.5	0.1	0.0	35.62	2.22	-3.50	0.0005	1.15	0.0005	0.00037
1	1	1	96.42	96.92	1460	2337	0.2	20.3	60.5	0.1	0.0	37.62	2.22	-3.70	0.0005	1.00	0.0005	0.00037
1	1	1	97.25	97.67	1495	2437	0.2	18.3	59.5	0.1	0.0	39.62	2.22	-3.90	0.0005	0.85	0.0005	0.00037
1	1	1	98.08	98.42	1530	2537	0.2	16.3	58.5	0.1	0.0	41.62	2.22	-4.10	0.0005	0.70	0.0005	0.00037
1	1	1	98.91	99.17	1565	2637	0.2	14.3	57.5	0.1	0.0	43.62	2.22	-4.30	0.0005	0.55	0.0005	0.00037
1	1	1	99.74	99.92	1600	2737	0.2	12.3	56.5	0.1	0.0	45.62	2.22	-4.50	0.0005	0.40	0.0005	0.00037
1	1	1	100.57	100.67	1635	2837	0.2	10.3	55.5	0.1	0.0	47.62	2.22	-4.70	0.0005	0.25	0.0005	0.00037
1	1	1	101.40	101.52	1670	2937	0.2	8.3	54.5	0.1	0.0	49.62	2.22	-4.90	0.0005	0.10	0.0005	0.00037
1	1	1	102.23	102.25	1705	3037	0.2	6.3	53.5	0.1	0.0	51.62	2.22	-5.10	0.0005	0.00	0.0005	0.00037
1	1	1	103.06	103.08	1740	3137	0.2	4.3	52.5	0.1	0.0	53.62	2.22	-5.30	0.0005	0.00	0.0005	0.00037
1	1	1	103.89	103.81	1775	3237	0.2	2.3	51.5	0.1	0.0	55.62	2.22	-5.50	0.0005	0.00	0.0005	0.00037
1	1	1	104.72	104.64	1810	3337	0.2	0.3	50.5	0.1	0.0	57.62	2.22	-5.70	0.0005	0.00	0.0005	0.00037
1	1	1	105.55	105.47	1845	3437	0.2	0.3	49.5	0.1	0.0	59.62	2.22	-5.90	0.0005	0.00	0.0005	0.00037
1	1	1	106.38	106.30	1880	3537	0.2	0.3	48.5	0.1	0.0	61.62	2.22	-6.10	0.0005	0.00	0.0005	0.00037
1	1	1	107.21	107.13	1915	3637	0.2	0.3	47.5	0.1	0.0	63.62	2.22	-6.30	0.0005	0.00	0.0005	0.00037
1	1	1	108.04	107.96	1950	3737	0.2	0.3	46.5	0.1	0.0	65.62	2.22	-6.50	0.0005	0.00	0.0005	0.00037
1	1	1	108.87	108.79	1985	3837	0.2	0.3	45.5	0.1	0.0	67.62	2.22	-6.70	0.0005	0.00	0.0005	0.00037
1	1	1	109.70	109.62	2020	3937	0.2	0.3	44.5	0.1	0.0	69.62	2.22	-6.90	0.0005	0.00	0.0005	0.00037
1	1	1	110.53	110.45	2055	4037	0.2	0.3	43.5	0.1	0.0	71.62	2.22	-7.10	0.0005	0.00	0.0005	0.00037
1	1	1	111.36	111.28	2090	4137	0.2	0.3	42.5	0.1	0.0	73.62	2.22	-7.30	0.0005	0.00	0.0005	0.00037
1	1	1	112.19	112.11	2125	4237	0.2	0.3	41.5	0.1	0.0	75.62	2.22	-7.50	0.0005	0.00	0.0005	0.00037
1	1	1	113.02	112.93	2160	4337	0.2	0.3	40.5	0.1	0.0	77.62	2.22	-7.70	0.0005	0.00	0.0005	0.00037
1	1	1	113.85	113.77	2195	4437	0.2	0.3	39.5	0.1	0.0	79.62	2.22	-7.90	0.0005	0.00	0.0005	0.00037
1	1	1	114.68	114.60	2230	4537	0.2	0.3	38.5	0.1	0.0	81.62	2.22	-8.10	0.0005	0.00	0.0005	0.00037
1	1	1	115.51	115.43	2265	4637	0.2	0.3	37.5	0.1	0.0	83.62	2.22	-8.30	0.0005	0.00	0.0005	0.00037
1	1	1	116.34	116.26	2300	4737	0.2	0.3	36.5	0.1	0.0	85.62	2.22	-8.50	0.0005	0.00	0.0005	0.00037
1	1	1	117.17	117.09	2335	4837	0.2	0.3	35.5	0.1	0.0	87.62	2.22	-8.70	0.0005	0.00	0.0005	0.00037
1	1	1	118.00	117.92	2370	4937	0.2	0.3	34.5	0.1	0.0	89.62	2.22	-8.90	0.0005	0.00	0.0005	0.00037
1	1	1	118.83	118.75	2405	5037	0.2	0.3	33.5	0.1	0.0	91.62	2.22	-9.10	0.0005	0.00	0.0005	0.00037
1	1	1	119.66	119.58	2440	5137	0.2	0.3	32.5	0.1	0.0	93.62	2.22	-9.30	0.0005	0.00	0.0005	0.00037
1	1	1	120.49	120.41	2475	5237	0.2	0.3	31.5	0.1	0.0	95.62	2.22	-9.50	0.0005	0.00	0.0005	0.00037
1	1	1	121.32	121.24	2510	5337	0.2	0.3	30.5	0.1	0.0	97.62	2.22	-9.70	0.0005	0.00	0.0005	0.00037
1	1	1	122.15	122.07	2545	5437	0.2	0.3	29.5	0.1	0.0	99.62	2.22	-9.90	0.0005	0.00	0.0005	0.00037
1	1	1	122.98	122.90	2580	5537	0.2	0.3	28.5	0.1	0.0	101.62	2.22	-10.10	0.0005	0.00	0.0005	0.00037
1	1	1	123.81	123.73	2615	5637	0.2	0.3	27.5	0.1	0.0	103.62	2.22	-10.30	0.0005	0.00	0.0005	0.00037
1	1	1	124.64	124.56	2650	5737	0.2	0.3	26.5	0.1	0.0	105.62	2.22	-10.50	0.0005	0.00	0.0005	0.00037
1	1	1	125.47	125.39	2685	5837	0.2	0.3	25.5	0.1	0.0	107.62	2.22	-10.70	0.0005	0.00	0.0005	0.00037
1	1	1	126.30	126.22	2720	5937	0.2	0.3	24.5	0.1	0.0	109.62	2.22	-10.90	0.0005	0.00	0.0005	0.00037
1	1	1	127.13	127.05	2755	6037	0.2	0.3	23.5	0.1	0.0	111.62	2.22	-11.10	0.0005	0.00	0.0005	0.00037
1	1	1	127.96	127.88	2790	6137	0.2	0.3	22.5	0.1	0.0	113.62	2.22	-11.30	0.0005	0.00	0.0005	0.00037
1	1	1	128.79	128.71	2825	6237	0.2	0.3	21.5	0.1	0.0	115.62	2.22	-11.50	0.0005	0.00	0.0005	0.00037
1	1	1	129.62	129.54	2860	6337	0.2	0.3	20.5	0.1	0.0	117.62	2.22	-11.70	0.0005	0.00	0.0005	0.00037
1	1	1	130.45	130.37	2895	6437	0.2	0.3	19.5	0.1	0.0	119.62	2.22	-11.90	0.0005	0.00	0.0005	0.00037
1	1	1	131.28	131.20	2930	6537	0.2	0.3	18.5	0.1	0.0	121.62	2.22	-12.10	0.0005	0.00	0.0005	0.00037
1	1	1	132.11	132.03	2965	6637	0.2	0.3	17.5	0.1	0.0	123.62	2.22	-12.30	0.0005	0.00	0.0005	0.00037
1	1	1	132.94	132.86	3000	6737	0.2	0.3	16.5	0.1	0.0	125.62	2.22	-12.50	0.0005	0.00	0.0005	0.00037
1	1	1	133.77	133.69	3035	6837	0.2	0.3	15.5	0.1	0.0	127.62	2.22	-12.70	0.0005	0.00	0.0005	0.00037
1	1	1	134.60	134.52	3070	6937	0.2	0.3	14.5	0.1	0.0	129.62	2.22	-12.90	0.0005	0.00	0.0005	0.00037
1	1	1	135.43	135.35	3105	7037	0.2	0.3	13.5	0.1	0.0	131.62	2.22	-13.10	0.0005	0.00	0.0005	0.00037
1	1	1	136.26	136.18	3140	7137	0.2	0.3	12.5	0.1	0.0	133.62	2.22	-13.30	0.0005	0.00	0.0005	



## AFATL P-001 AAASIM - AIRCRAFT COMBAT SURVIVABILITY SCENARIO

PK AS A FUNCTION OF ASPECT SECTOR AND IMPACT SPEED.									
SECTOR	ALTIMUTH REAR=00	ELEV. DOWN=00	LOC 3	GY 2	EM 1	X 13600.	Y 7200.	Z	RADIUS O.M
			0-152	152-305	305-457	457-610	610-762	762-914	914-1067
29	180-225	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	225-270	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	270-315	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	315-360	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTALS	0.0	0.0	0.0	0.0000267	0.0003423	0.0	0.0	0.0	0.0003690





LOCATION	4	GUN TYPE	2	ERROR MODE	1	POSITION=	13400.0, 8000.0, 20.0)	RADIUS=	0.0 M																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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## ECM INPUTS (INITIAL OR CHANGED)

IP = 5  
LA = 0  
GAIN(JOB) = 1.00  
P1(W) = 500.00  
PLEN(S) = 0.0  
TX = 1  
XSEC(SOH) = 0.0  
XSEC(SOH) = 1.00  
TRFCM = 1.00  
SOTMAXJOB = 3.00

JAMMER ANTENNA GAIN 1.000 DB

AIRCRAFT CROSS SECTION TABLE SPECIFIED. PRINTED VALUES WILL BE MULTIPLIED BY CALX= 1.00



TABLE DATA

19 ELEMENTS FROM 0.0 TO 180.00 BY 10.00 AZ  
 7 ELEMENTS FROM -90.00 TO 90.00 BY 30.00 EL  
 ELSEWHERE TABLE IS 1000.00



PCS MATRIX

	0	10	20	30	40	50	60	70	80	90	100	110	120
120.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-120.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-90.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-60.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-30.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
30.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
60.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
90.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
120.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00



PCF MATRIX	130	140	150	160	170	180
-120.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-90.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-60.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-30.0	0.07	0.07	0.07	0.07	0.11	0.45
30.0	0.07	0.07	0.07	0.07	0.11	0.45
60.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
90.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
120.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00









AFATL P-001 AAASIM - AIRCRAFT-COMBAT-SURVIVABILITY-SCENARIO

LOCATION 5 GUN TYPE 3 ERRCR MODE 4 POSITION=( 11300.0, 9700.0, 50.0) RADIUS= 0.0 M  
 L DEM FIRE FLT INTCP FIRE INTCP SIG1 SIG2 BIAS1 BIAS2 CLOSE AZIM ELEV MEAN VULN  
 TIME TIME TIME RANGE RANGE RANGE RATE RATE AZ.FRR EL.ERR AREA SHOT PK CUM.PK

PK AS A FUNCTION OF ASPECT SECTOR AND IMPACT SPEED. LOC 5 GT 3 EM 4 X 11300. Y 5700. Z 1067-1219 TOTAL PK

SECTOR	ASPECT	ELEV.	LOC	5	GT 3	EM 4	X 11300.	Y 5700.	Z 1067-1219	TOTAL PK
1	00-045	00-045	0-152	152-303	303-457	457-610	610-762	762-914	914-1067	0.0
2	00-045	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	00-045	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	00-045	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	00-045	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	00-045	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	00-045	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	00-045	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	00-045	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	00-045	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	00-045	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	00-045	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	00-045	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	00-045	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	00-045	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	00-045	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	00-045	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	00-045	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	00-045	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	00-045	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	00-045	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	00-045	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	00-045	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	00-045	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	00-045	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	00-045	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	00-045	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	00-045	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	00-045	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	00-045	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	00-045	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	00-045	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTALS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0



AFATL P-001 AAASIM - AIRCRAFT COMBAT SURVIVABILITY SCENARIO

MULTIPATH INPUTS INITIAL OR CHANGED

IRMP = 1  
REFC = 0.350







DOI: 10.1002/for





LOCATION	6	GUN TYPE	3	ERROR MODE	3	POSITION=(15600.0, 10900.0, 90.0)	RADIUS=	0.0 M	MEAN FL-ERR	VULN AREA	SHOT PK	CUM-PK
1	DEM											
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LOCATION	GUN TYPE	ERROR MODE	POSITION=(	15600.0,	10900.0,	90.01	RADIUS=	0.0 M	MEAN EL	PLAN EL	VULN AREA	SHOT PK	CUM.PK
J N DEM	0	3	0	0	0	0	0	0	0	0	0	0	0
FIRE TIME	0	0	0	0	0	0	0	0	0	0	0	0	0
FLT TIME	0	0	0	0	0	0	0	0	0	0	0	0	0
INCP TIME	0	0	0	0	0	0	0	0	0	0	0	0	0
FIRE RANGE	0	0	0	0	0	0	0	0	0	0	0	0	0
INCP RANGE	0	0	0	0	0	0	0	0	0	0	0	0	0
INCP	0	0	0	0	0	0	0	0	0	0	0	0	0
SIG1	0	0	0	0	0	0	0	0	0	0	0	0	0
SIG2	0	0	0	0	0	0	0	0	0	0	0	0	0
BIAS1	0	0	0	0	0	0	0	0	0	0	0	0	0
BIAS2	0	0	0	0	0	0	0	0	0	0	0	0	0
CLOSE VEL	0	0	0	0	0	0	0	0	0	0	0	0	0
CLOSE	0	0	0	0	0	0	0	0	0	0	0	0	0
AZIM RATE	0	0	0	0	0	0	0	0	0	0	0	0	0
ELEV RATE	0	0	0	0	0	0	0	0	0	0	0	0	0
AZ.ERN	0	0	0	0	0	0	0	0	0	0	0	0	0
MEAN EL	0	0	0	0	0	0	0	0	0	0	0	0	0
PLAN EL	0	0	0	0	0	0	0	0	0	0	0	0	0
VULN AREA	0	0	0	0	0	0	0	0	0	0	0	0	0
SHOT PK	0	0	0	0	0	0	0	0	0	0	0	0	0
CUM.PK	0	0	0	0	0	0	0	0	0	0	0	0	0











AFAIL P-001 AAASIM \* AIRCRAFT COMBAT SURVIVABILITY SCENARIO  
 LOCATION 6 GUN TYPE 3 ERROR MODE 3 POSITION=( 15600.0, 10900.0, 90.01 RAD'US= 0.0 M

L N DEM	FIRE TIME	FLT TIME	INTCP TIME	FIRE RANGE	INTCP RANGE	SIG1	SIG2	BIAS1	BIAS2	CLOSE VEL.	AZIM RATE	ELEV RATE	MEAN AZ. ERR	MEAN EL. ERR	PEAN	VULM AREA	SHOT PK	CUP. PK
1	05.18	4.85	0.76	360	310	4	0	125.5	55.2	317.9	5.47	0.21	0.02	0.02	0.0	9.08	0.0000	0.0035
1	05.24	4.86	0.85	355	311	4	1	111.5	55.3	316.8	5.49	0.15	0.02	0.0	0.0	9.01	0.0000	0.0035
1	06.06	4.86	1.00	353	312	4	1	111.5	55.2	315.9	5.52	0.14	0.02	0.0	0.0	8.95	0.0000	0.0035
1	06.17	4.86	1.13	347	313	4	1	110.3	54.9	315.1	5.53	0.14	0.03	0.0	0.0	8.92	0.0000	0.0036
1	06.30	4.87	1.29	344	314	4	1	98.4	54.8	314.7	5.54	0.16	0.03	0.0	0.0	8.92	0.0001	0.0037
1	06.40	4.87	1.40	343	315	4	1	92.7	54.5	314.1	5.55	0.18	0.03	0.0	0.0	8.86	0.0001	0.0038
1	06.49	4.88	1.50	343	316	4	1	88.1	54.2	313.6	5.56	0.20	0.03	0.0	0.0	8.82	0.0002	0.0039
1	06.59	4.88	1.60	343	317	4	1	85.1	54.1	313.0	5.59	0.20	0.04	0.0	0.0	8.78	0.0002	0.0041
1	06.59	4.89	1.70	343	318	4	1	83.1	54.0	309.8	5.63	0.19	0.04	0.0	0.0	8.77	0.0003	0.0046
1	06.59	4.90	1.80	343	319	4	1	81.0	53.9	306.4	5.65	0.18	0.05	0.0	0.0	8.70	0.0005	0.0053
1	06.59	4.90	1.90	343	320	4	1	77.7	53.9	305.0	5.68	0.15	0.05	0.0	0.0	8.65	0.0005	0.0063
1	06.59	4.90	2.00	343	321	4	1	77.7	53.9	303.2	5.72	0.15	0.05	0.0	0.0	8.60	0.0006	0.0069
1	06.59	4.90	2.10	343	322	4	1	76.4	53.9	300.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0007	0.0075
1	06.59	4.90	2.20	343	323	4	1	75.5	53.9	300.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0007	0.0089
1	06.59	4.90	2.30	343	324	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0007	0.0104
1	06.59	4.90	2.40	343	325	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0008	0.0119
1	06.59	4.90	2.50	343	326	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0008	0.0134
1	06.59	4.90	2.60	343	327	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0009	0.0149
1	06.59	4.90	2.70	343	328	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0009	0.0164
1	06.59	4.90	2.80	343	329	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0179
1	06.59	4.90	2.90	343	330	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0194
1	06.59	4.90	3.00	343	331	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0209
1	06.59	4.90	3.10	343	332	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0224
1	06.59	4.90	3.20	343	333	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0239
1	06.59	4.90	3.30	343	334	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0254
1	06.59	4.90	3.40	343	335	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0269
1	06.59	4.90	3.50	343	336	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0284
1	06.59	4.90	3.60	343	337	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0299
1	06.59	4.90	3.70	343	338	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0314
1	06.59	4.90	3.80	343	339	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0329
1	06.59	4.90	3.90	343	340	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0344
1	06.59	4.90	4.00	343	341	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0359
1	06.59	4.90	4.10	343	342	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0374
1	06.59	4.90	4.20	343	343	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0389
1	06.59	4.90	4.30	343	344	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0404
1	06.59	4.90	4.40	343	345	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0419
1	06.59	4.90	4.50	343	346	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0434
1	06.59	4.90	4.60	343	347	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0449
1	06.59	4.90	4.70	343	348	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0464
1	06.59	4.90	4.80	343	349	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0479
1	06.59	4.90	4.90	343	350	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0494
1	06.59	4.90	5.00	343	351	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0509
1	06.59	4.90	5.10	343	352	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0524
1	06.59	4.90	5.20	343	353	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0539
1	06.59	4.90	5.30	343	354	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0554
1	06.59	4.90	5.40	343	355	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0569
1	06.59	4.90	5.50	343	356	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0584
1	06.59	4.90	5.60	343	357	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0599
1	06.59	4.90	5.70	343	358	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0614
1	06.59	4.90	5.80	343	359	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0629
1	06.59	4.90	5.90	343	360	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0644
1	06.59	4.90	6.00	343	361	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0659
1	06.59	4.90	6.10	343	362	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0674
1	06.59	4.90	6.20	343	363	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0689
1	06.59	4.90	6.30	343	364	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0704
1	06.59	4.90	6.40	343	365	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0719
1	06.59	4.90	6.50	343	366	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0734
1	06.59	4.90	6.60	343	367	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0749
1	06.59	4.90	6.70	343	368	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0764
1	06.59	4.90	6.80	343	369	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0779
1	06.59	4.90	6.90	343	370	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0794
1	06.59	4.90	7.00	343	371	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0809
1	06.59	4.90	7.10	343	372	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0824
1	06.59	4.90	7.20	343	373	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0839
1	06.59	4.90	7.30	343	374	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0854
1	06.59	4.90	7.40	343	375	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0869
1	06.59	4.90	7.50	343	376	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0884
1	06.59	4.90	7.60	343	377	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0899
1	06.59	4.90	7.70	343	378	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0914
1	06.59	4.90	7.80	343	379	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0929
1	06.59	4.90	7.90	343	380	4	1	75.5	53.9	299.9	5.73	0.15	0.05	0.0	0.0	8.55	0.0010	0.0944
1	06.59	4.90	8.00	343	381													









PK AS A FUNCTION OF ASPECT SECTOR AND IMPACT SPEED.		LOC	6	GT 3	EM 3	X 15600.	Y 15500.	Z	90.	RADIUS	0.4
SECTOR	AZIMUTH ELEV. REAR=00 DOWN=00	0-152	152-305	305-457	457-610	610-762	762-914	914-1067	1067-1219	TOTAL PK	
32	315-360 155-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
TOTALS		0.0	0.0039258	0.0073024	0.0	0.0	0.0	0.0	0.0	0.0111996	

## MULTIPATH INPUTS (INITIAL OR CHANGED)

IRMP = 2  
REFC = 0.350

## ECM INPUTS (INITIAL OR CHANGED)

IP = 5  
IJ = 0  
GAINJ(08) = 1.00  
PAC(W) = 500.00  
PLEN(S) = 0.0  
IX = 1  
XSEC(SOM) = 0.0  
CALX = 1.000  
TREC = 3  
SUMAX(08) = 17.00

JAMMER ANTENNA GAIN 1.000 DB

AIRCRAFT CROSS SECTION TABLE SPECIFIED. PRINTED VALUES WILL BE MULTIPLIED BY CALX. CALX= 1.00



TABLE DATA

19 ELEMENTS FROM  
7 ELEMENTS FROM  
ELSEWHERE TABLE IS

0.0 TO 100.00  
180.00 BY 90.00 BY 10.00 AZ  
30.00 EL





EEV MATRIX

	0	10	20	30	40	50	60	70	80	90	100	110	120
-120.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-90.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-60.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-30.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
0.0	0.27	0.18	0.05	0.02	0.16	0.17	0.04	0.07	0.17	0.05	0.02	0.01	0.01
30.0	0.27	0.18	0.05	0.02	0.16	0.17	0.04	0.07	0.17	0.05	0.02	0.01	0.01
60.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
90.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
120.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00



PCS MATRIX

-100.0	100.00	140	1000.00	150	1000.00	160	1000.00	170	1000.00	180	1000.00
-50.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
-30.0	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.11	0.11	0.45	0.45
30.0	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.11	0.11	0.45	0.45
60.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
120.0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00



UNVULNERABLE AREA (SQ. METERS) AS A FUNCTION OF IMPACT SPEED (METERS/SEC) AND ASPECT VIEW  
VULNERABLE AREA TABLE VS TYPE 5 WEAPON

[illegible]





L	N	DEN	FIRE TIME	FLT TIME	INTCP TIME	FIRE RANGE	INTCP RANGE	SIG1	SIG2	BIAS1	BIAS2	CLOSE VEL.	AZIM RATE	ELEV RATE	AZ. ERR	MEAN EL. ERR	VULN AREA	SHOT PK	CUM. PK
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449	1600	1333	0000	0000	0000	0000	0000	0000
1	1	0	971225	111000	001111	1189	5561	3333	5000	3449	3449</								











[illegible]





PK AS A FUNCTION OF ASPECT SECTOR AND IMPACT SPEED.															Y 7500.		Z 1067-1219		RADIUS 0.0		TOTAL PK				
SECTOR	AZIMUTH		ELEV.		LOC		GT 5		EM 3		X 12800.		Y 7500.		Z 1067-1219		RADIUS 0.0		TOTAL PK						
	HEAR=00	HEAR=00	0-152		152-305		305-457		457-610		610-762		762-914		914-1067		1067-1219		TOTAL PK						
14	225-270	045-090	0.0	0.0	0.000294	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.000294	0.0	0.000294					
15	270-315	045-090	0.0	0.0	0.0002650	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0002650	0.0	0.0002650					
16	315-360	045-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
17	000-045	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
18	045-090	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
19	090-135	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
20	135-180	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
21	180-225	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
22	225-270	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
23	270-315	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
24	315-360	090-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
25	000-045	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
26	045-090	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
27	090-135	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
28	135-180	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
29	180-225	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
30	225-270	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
31	270-315	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
32	315-360	135-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
TOTALS															0.0001108	0.0008536	0.0002945	0.0079175	0.0166521	0.0438568	0.0	0.0	0.0684357	0.0	0.0



LOC	PKILL	RCUNDS	FIRE TIME	XGUN	YGUN	ZGUN	RADIUS GL	T REACT	T TRACK	GL	FM	CO	SP	LOC
1	0.0	0	0.0	1500.00	500.00	40.00	0.0	0.0	2.00	1	1	1	1	1
2	0.0010946	7	5.25	15200.00	6200.00	40.00	0.0	0.0	2.00	2	2	2	2	2
3	0.0003691	17	6.80	13600.00	7200.00	20.00	0.0	0.0	2.00	3	3	3	3	3
4	0.0	0	0.0	13400.00	6000.00	20.00	0.0	0.0	2.00	4	4	4	4	4
5	0.0	0	0.0	13300.00	5700.00	50.00	0.0	0.0	6.00	5	5	5	5	5
6	0.0112059	422	21.10	15600.00	10900.00	90.00	0.0	0.0	6.00	6	6	6	6	6
7	0.0684375	134	51.42	12800.00	7500.00	20.00	0.0	0.0	6.00	7	7	7	7	7

LOC	TIME 1	TIME 2	TIME 3	TIME 4	TIME 5	TIME 6	TIME 7	TIME 8	TIME 9	TIME10
1	11:47	22:95	34:42	45:89	57:37	68:84	80:31	91:78	103:26	999:99
2	11:47	22:95	34:42	45:89	57:37	68:84	80:31	91:78	103:26	559:59
3	11:47	22:95	34:42	45:89	57:37	68:84	80:31	91:78	103:26	559:59
4	11:47	22:95	34:42	45:89	57:37	68:84	80:31	91:78	103:26	559:59
5	11:47	22:95	34:42	45:89	57:37	68:84	80:31	91:78	103:26	559:59
6	11:47	22:95	34:42	45:89	57:37	68:84	80:31	91:78	103:26	999:99
7	11:47	22:95	34:42	45:89	57:37	68:84	80:31	91:78	103:26	999:99

LOC	PK(TF 1)	PK(TF 2)	PK(TF 3)	PK(TF 4)	PK(TF 5)	PK(TF 6)	PK(TF 7)	PK(TF 8)	PK(TF 9)	PK(TF10)
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.000997	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.000957	0.000945	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0003690	0.0003690	0.0003650
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

LOC	PK(TI 1)	PK(TI 2)	PK(TI 3)	PK(TI 4)	PK(TI 5)	PK(TI 6)	PK(TI 7)	PK(TI 8)	PK(TI 9)	PK(TI10)
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0003690	0.0003690	0.0003690
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

LOC	PK(TI 1)	PK(TI 2)	PK(TI 3)	PK(TI 4)	PK(TI 5)	PK(TI 6)	PK(TI 7)	PK(TI 8)	PK(TI 9)	PK(TI10)
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0003690	0.0003690	0.0003690
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

LOC	PK(TI 1)	PK(TI 2)	PK(TI 3)	PK(TI 4)	PK(TI 5)	PK(TI 6)	PK(TI 7)	PK(TI 8)	PK(TI 9)	PK(TI10)
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0





LOC	PK(TI 1)	PK(TI 2)	PK(TI 3)	PK(TI 4)	PK(TI 5)	PK(TI 6)	PK(TI 7)	PK(TI 8)	PK(TI 9)	PK(TI 10)
7	0.0	0.0	0.0	0.0	0.0	0.0025023	0.016661	0.0491013	0.0009465	0.0003037
7CUM	0.0	0.0	0.0	0.0	0.0	0.0025023	0.0191067	0.0672699	0.0681527	0.0684356

LOC	RHO 1	RHO 2	RHO 3	RHO 4	RHO 5	RHO 6	RHO 7	RHO 8	RHO 9
1	1.00000								
2	1.00000								
3	1.00000								
4	1.00000								
5	1.00000								
6	1.00000								
7	1.00000								

## ATTRITION ACCRUED AS A FUNCTION OF TIME OF FIRE

TIME SEG.	CUM FOR CLASS 1	DENSITY CLASS 1	DENSITY CLASS 2	DENSITY CLASS 3	DENSITY CLASS 4	DENSITY CLASS 5	DENSITY CLASS 6	DENSITY CLASS 7	DENSITY CLASS 8	DENSITY CLASS 9
1	0.0	0.0								
2	0.0	0.0								
3	0.0	0.0								
4	0.0	0.0								
5	0.0024045	0.0024045								
6	0.0025303	0.001261								
7	0.0220685	0.0195878								
8	0.0693287	0.0463268								
9	0.0766286	0.0076437								
10	0.0802163	0.0038655								

## ATTRITION ACCRUED AS A FUNCTION OF TIME AT INTERCEPT

TIME SEG.	CUM FOR CLASS 1	DENSITY CLASS 1	DENSITY CLASS 2	DENSITY CLASS 3	DENSITY CLASS 4	DENSITY CLASS 5	DENSITY CLASS 6	DENSITY CLASS 7	DENSITY CLASS 8	DENSITY CLASS 9
1	0.0	0.0								
2	0.0	0.0								
3	0.0	0.0								
4	0.0	0.0								
5	0.0	0.0								
6	0.0025023	0.0025023								
7	0.0191067	0.016661								
8	0.0676140	0.0466521								
9	0.0766475	0.0090451								
10	0.0802164	0.0045121								
TOTALS		0.0802243								





## TOTAL PK FOR DENSITY CLASS 1 AS A FUNCTION OF ASPECT SECTOR AND IMPACT SPEED.

SECTOR	AZIMUTH REAR=00	ELEV. UGW=00	0-152	152-305	305-457	457-610	610-762	762-914	914-1067	1067-1219	TOTAL PK
1	00-045	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	045-090	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	090-135	00-045	0.0	0.0	0.0	0.0	0.0001340	0.0	0.0	0.0	0.0001340
4	135-180	00-045	0.0	0.0	0.0	0.0	0.0002519	0.0	0.0	0.0	0.0002519
5	180-225	00-045	0.0	0.0003255	0.0012023	0.0	0.0	0.0	0.0	0.0	0.0015274
6	225-270	00-045	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	270-315	00-045	0.0	0.000411	0.0	0.0	0.0	0.0	0.0	0.0	0.000411
8	315-360	00-045	0.0001108	0.0001518	0.0	0.0	0.0	0.0	0.0	0.0	0.0002626
9	00-045	04-090	0.0	0.0000374	0.0	0.0	0.0	0.0	0.0	0.0	0.0000374
10	045-090	04-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	090-135	04-090	0.0	0.0	0.0	0.0	0.0007089	0.0	0.0	0.0	0.0007089
12	135-180	04-090	0.0	0.0	0.0058241	0.0025407	0.0	0.0030211	0.0	0.0	0.0079221
13	180-225	04-090	0.0	0.0036015	0.0002850	0.0	0.0167684	0.0	0.0	0.0	0.0035247
14	225-270	04-090	0.0	0.0	0.000224	0.0	0.0	0.0	0.0	0.0	0.000294
15	270-315	04-090	0.0	0.0006235	0.0002650	0.0	0.0	0.0	0.0	0.0	0.0008884
16	315-360	04-090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	00-045	08-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	045-090	08-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	090-135	08-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	135-180	08-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	180-225	08-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	225-270	08-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	270-315	08-135	0.0	0.0	0.0	0.0	0.0001868	0.0392846	0.0	0.0	0.0392846
24	315-360	08-135	0.0	0.0	0.0	0.0054171	0.00017850	0.0017850	0.0	0.0	0.0019715
25	00-045	12-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0054171
26	045-090	12-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	090-135	12-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	135-180	12-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	180-225	12-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	225-270	12-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	270-315	12-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	315-360	12-180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTALS			0.0001108	0.0047761	0.0075947	0.0079440	0.0180647	0.0435568	0.0	0.0	0.0802164

\*\*\*\* END OF JOB - - POOL SCENARIO RUN COMPLETE \*\*\*\*



# APPENDIX H

## P001 INPUT PROGRAM (PIP) LISTING

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*****
THIS PROGRAM WILL PUNCH ALL REQUIRED CARDS FOR THE EXECUTION OF THE
P001 ANALYSIS WITH THE EXCEPTION OF THE FIRST CARD (THE GREEN JOB
CARD) AND THE LAST CARD (THE ORANGE END OF FILE CARD). THE MINIMAL
INPUT TO THIS PROGRAM IS THE X, Y AND Z COORDINATES FOR EACH OF THE
FLIGHT PATH MILESTONES. SIX GUN EMPLACEMENT LOCATIONS MAY BE
SPECIFIED IF THE SIX PRESET GUN LOCATIONS ARE NOT DESIRED. IF THE
PRESET GUN EMPLACEMENT LOCATIONS ARE USED, THE FINAL DATA SCENARIO
CONTROL CARD THAT SPECIFIES THE DESIRED INPUT, OUTPUT AND SCENARIO
OPTIONS. IF THE PRESET GUN LOCATIONS ARE NOT USED, THE FINAL DATA
CARDS WILL BE THE 6 INPUT GUN LOCATION CARDS.
*****
MILESTONE CARDS: THE X, Y, Z COORDINATES FOR UP TO 199 FLIGHT PATH
MILESTONES MUST BE ENTERED IN 3F10.0 FORMAT, ONE MILESTONE PER INPUT
CARD. THE VALUES (IN METERS) MUST BE ENTERED IN DECIMAL FORM WITH THE
X COORDINATE IN COLUMNS 1-10, THE Y COORDINATE IN COLUMNS 11-20 AND
Z COORDINATE IN COLUMNS 21-30. THE DECIMAL POINT MUST APPEAR IN EACH
COORDINATE VALUE.
*****
MILESTONE DELIMITER CARD: A CARD CONTAINING 99999. LEFT JUSTIFIED
(INPUT FORMAT F6.0) MUST BE PLACED AFTER THE FINAL MILESTONE CARD TO
MARK THE END OF THE MILESTONE DATA INPUT.
*****
CONTROL CARD: A CONTROL CARD SPECIFYING THE CRUISE SPEED, THE NUMBER
OF THE BOMB RELEASE MILESTONE (COUNT THE INITIAL POSITION AS MILE-
STONE 1), 8 INPUT/OUTPUT/SCENARIO OPTIONS AND THE JAMMER POWER
FCLLCWS. THE "99999." CARD. THE DATA ON THE OPTION CARD MUST BE
SPECIFIED IN F10.0, I2, 8I1, F10.0 FORMAT.
*****
F10.0: THE AIRCRAFT CRUISE SPEED IN METERS PER SECOND.
I2: THE NUMBER OF THE BOMB RELEASE MILESTONE.
I1: EW OPTION - 0 FOR NO EW; 1 FOR EW (WITH EW, AN AIRBORNE
JAMMER IS USED TO JAM TRACKING RADARS.
I1: ANTI-JAM OPTION - 0 FOR NO AJ; 1 FOR AJ (WITH AJ, RADAR
SYSTEMS WITH THE CAPABILITY TO USE AJ AGAINST THE JAMMER.)
I1: MULTIPATH OPTION - 0 FOR NO MULTIPATH; 1 FOR MULTIPATH (IF
SPECIFIED, THE EFFECTS OF RADAR MULTIPATH ARE INCLUDED IN THE RADAR
SYSTEMS THAT ARE AFFECTED BY MULTIPATH.)
I1: GUN EMPLACEMENT LOCATION INPUT OPTION - 0 FOR PRESET GUN
LOCATIONS; 1 FOR GUN EMPLACEMENT LOCATIONS INPUT AS DATA.
I1: LIST OPTION - 0 FOR NO LISTING OF THE P001 INPUT DECK;
1 FOR LIST OF P001 INPUT - 0 FOR NO P001 INPUT PUNCHED CARDS DESIRED;
1 FOR P001 INPUT DECK PROVIDED AS PART OF THE CUTPUT.
I1: PLOT OPTION - 0 FOR NO PLOT OF FLIGHT PATH AND GUN LOCATIONS
DESIRED; 1 FOR PLOT DESIRED.
*****

```





```

11: EXTENDED OUTPUT OPTION - 0 FCR NO EXTENDED OUTPUT DESIRED;
1 FOR EXTENDED PRINTOUT DESIRED AS OUTPUT.
F10.0: JAMMER PCWER - MUST BE BETWEEN 0 TC 1000 WATTS.

GUN EMPLACEMENT LOCATION CARDS: IF DESIRED AS INPUT DATA, THE 6 GUN
EMPLACEMENT LOCATION CARDS FOLLOW THE OPTION CONTROL CARD IN
THE SAME FORMAT AS THE MILESTONE CARDS (3F13.0). THE GUN EMPLACEMENT
CARDS MUST BE PLACED IN THE FOLLOWING ORDER: 2 TYPE 1, 2 TYPE
2 MODE 1, 1 TYPE 3, 3 MODE 4, 1 TYPE 3, 3 MODE 3. WHETHER OR NOT THE
PRESET GUN LOCATION OPTION IS SPECIFIED, 1 TYPE 5 MODE 3 WEAPON IS
ADDED TO THE SCENARIO. THE LOCATION OF THIS GUN IS FIXED AND IS
SPECIFIED BY THE PROGRAM.

INPUT DECK EXAMPLE: (FOR 10 MILESTONES)

1000. -200. 100.
1200. -300. 200.
1525. -350. 450.
1800. -400. 350.
2100. -525. 400.
2350. -655. 375.
2500. -803. 425.
2815. -1055. 450.
3000. -1100. 500.
3200. -1215. 625.
3999. 071111110 500.0
232.0 2000. 60.
1000. 1600. 30.
1200. -550. 0.
2575. (ETC., UNTIL ALL 6 GUN EMPLACEMENTS ARE LOCATED.)

*****MAIN PROGRAM*****
////////
DIMENSION X10(200), Y10(200)
DIMENSION M(200), VEL(200), XDOT(200), YDOT(200), ZDCT(200), X(200)
1), Y(200), Z(200), HDG(200), CA(200), T(200), HDGDEG(200), CADEG(2
200), RA(200), TINK(10), XGUN(15), YGUN(15), ZGUN(15), XCIRC(25), Y
3CIRC(25)
DIMENSION TNRT(200), ITNMAX(200), TNRTDG(200), TNCGR(200), ISTALL(
1200), G(200), ABSRT(200), DT(200)
DIMENSION RCSTAB(1000)
DIMENSION VAT1N2(208), VAT3(208), VAT5(208)

C PREDETERMINED GUN EMPLACEMENT LOCATIONS

```





```

C      DATA XGUN/14800.,16200.,13600.,13400.,11300.,15600.,12800./
C      DATA YGUN/9000.,8200.,7200.,8000.,9700.,10900.,7500./
C      DATA ZGUN/40.,40.,20.,20.,50.,90.,20./
C
C      VULNERABLE AREA TABLE VS TYPE 1 AND 2 WEAPONS
C
C      DATA VAT1N2/2*.4645,6*7.107,2*.6568,6*5.551,2*.6968,6*5.574,2*.656
18,6*7.357,2*.6968,6*5.574,2*.6568,6*5.551,2*.6968,6*5.574,2*.6568,
26,6*7.357,2*.6968,6*5.574,2*.6568,6*5.551,2*.6968,6*5.574,2*.6568,
33,2*98,2*.6568,6*2.858,2*.4645,6*7.432,2*.6568,6*2.858,2*.4645,6*3.
42,58,2*.6568,6*2.858,2*.6568,6*5.551,2*.6968,6*5.574,2*.6568,6*7.35
57,2*.6968,6*5.574,2*.6568,6*5.551,2*.6968,6*5.574,2*.6568,6*7.357,
62*.6968,6*5.574,2*.4645,6*7.107/
C
C      VULNERABLE AREA TABLE VS TYPE 3 WEAPONS
C
C      DATA VAT3/2*12.54,6*13.47,2*9.853,6*10.51,2*9.639,6*11.15,2*12.64,
16*14.78,2*9.639,6*11.15,2*9.853,6*10.51,2*9.639,6*11.15,2*12.64,
214.78,2*9.639,6*11.15,8*1.394,2*4.762,6*6.240,2*5.342,2*4.762,2*4.
3762,6*6.240,8*1.394,2*4.762,6*6.240,2*5.342,2*4.762,6*6.24
40,2*9.853,6*10.51,2*9.639,6*11.15,2*12.64,6*14.78,2*9.639,6*11.15,
52*9.853,6*10.51,2*9.639,6*11.15,2*12.64,6*14.78,2*9.639,6*11.15,2*
612.54,6*13.47/
C
C      VULNERABLE AREA TABLE VS TYPE 5 WEAPONS
C
C      DATA VAT5/8*55.37,8*43.22,8*47.10,8*62.53,8*47.10,8*43.22,8*47.10,
18*62.53,8*47.10,8*5.761,8*27.45,8*33.07,8*27.45,8*5.761,8*27.45,8*
233.07,8*27.45,8*5.761,8*47.10,8*62.53,8*47.10,8*43.22,8*47.10,8*62
3.53,8*47.10,8*55.37/
C
C      RADAR CROSS SECTION TABLE
C
C      DATA RCSTAB/19*1000.,19*100.,.273,.178,.053,.023,.156,.166,.063,.1
173,.235,.047,.02,.015,.011,.073,.072,.019,.028,.11,.454,.005,.005,
2.007,.011,.093,.093,.039,.068,.112,.032,.019,.015,.009,.035,.032,.
3017,.033,.102,.509,.273,.178,.053,.023,.156,.166,.063,.173,.235,.0
447,.02,.015,.011,.073,.072,.019,.028,.11,.454,19*100.,19*1000./
C
C      CALL ERRSET SUPPRESSES ANY POSSIBLE UNDERFLOW PROBLEMS THAT MAY
C      RESULT FROM MANIPULATION OF SCENARIO PARAMETERS.
C      CALL ERRSET (208,50,-1,1,1)
C
C      PI = 3.14159
C      MNUM = 0
C      IBR = 0

```



```

725
730
735
740
745
750
755
760
765
770
775
780
785
790
795
800
805
810
815
820
825
830
835
840
845
850
855
860
865
870
875
880
885
890
895
900
905
910
915
920
925
930
935
940
945
950
955
960

READ THE MILESTONE CARDS, COUNT THE NUMBER OF MILESTONES AND STOP
INPUT UPON REACHING THE '99999.' DELIMITER CARC.

      DO 1 I=1,200
      READ (5,40) X(I),Y(I),Z(I)
      IF (X(I).EQ.99999.) GO TO 2
      MNUM = MNUM+1
      X10(I) = X(I)/2000.0
      Y10(I) = Y(I)/2000.0
1  CONTINUE

2  CONTINUE

READ THE CRUISE SPEED, BOMB RELEASE MILESTONE, EW OPTION, ANTI-JAM
OPTION, MULTIPATH OPTION, GUN LOCATION INPUT OPTION AND THE LIST
PUNCH, PLOT AND EXTENDED OUTPUT OPTICS AND THE JAMMER POWER.

      READ (5,42) CVEL,MBR,IEW,IAJ,IMULT,IGUN,ILST,IPNCH,IEXT,PJAM
      JAMMER ON BUT JAMMER POWER = 0 ??? THEN TURN JAMMER OFF.

      IF (IEW.EQ.1.AND.PJAM.LE.0.0) IPJAM1=1
      IF (IPJAM1.EQ.1) IEW=0
      IF (IPJAM1.EQ.1) WRITE (6,43)

      JAMMER POWER GREATER THAN 1000 WATTS ??? THEN LIMIT IT TO 1000 WATTS

      IF (PJAM.GT.1000) IPJAM2=1
      IF (IPJAM2.EQ.1) PJAM=1000
      IF (IPJAM2.EQ.1.AND.IEW.EQ.1) WRITE (6,44)

      AJ ON BUT JAMMER OFF ??? THEN TURN AJ OFF.

      IF (IAJ.EQ.1.AND.IEW.EQ.0) WRITE (6,45)
      IF (IEW.EQ.0) IAJ = 0

      CPTICN TO INPUT THE 6 ADDITIONAL GUN EMPLACEMENT LOCATIONS

      IF (IGUN.NE.1) GO TO 3

      DC 3 I=1,6

```



```

3  READ (5,41,END=38) XGUN(I),YGUN(I),ZGUN(I)
   CONTINUE

```

```

CALCULATE THE X, Y AND Z VELOCITIES, THE CLIMB ANGLE, HEADING AND
ROLL ANGLE AND THE TIME AT EACH MILESTONE ALONG WITH VARIOUS OTHER
PARAMETERS FOR LATER USE.

```

```

DO 9 I=1,MNUM
  IF (I.NE.MNUM) GO TO 4

```

```

CALCULATIONS FOR THE FINAL MILESTONE

```

```

  HDG(I) = HDG(I-1)
  HCGDEG(I) = HDG(I)*57.29578
  IF (HCGDEG(I).LT.0) HDGDEG(I)=HDGDEG(I)+360
  RA(I) = 0
  CADEG(I) = 0
  ZCOT(I) = 0
  XDOT(I) = VEL(I)*COS(PDG(I))
  YDOT(I) = VEL(I)*SIN(PDG(I))
  TNRT(I) = 0
  GO TO 8

```

```

GENERAL COORDINATE CALCULATIONS FOR LATER USE

```

```

4  CCNTINUE
   DX = X(I+1)-X(I)
   DX2 = DX**2
   DY = Y(I+1)-Y(I)
   DY2 = DY**2
   DZ = Z(I+1)-Z(I)
   DZ2 = DZ**2
   DIST = SQRT(DX2+DY2+DZ2)

```

```

CLIMB ANGLE CALCULATIONS

```

```

  CA(I) = ATAN2(DZ, SQRT(DX2+DY2))
  IF (CA(I).GT.1.5533) CA(I)=1.5533
  CADEG(I) = CA(I)*57.29578

```

```

HEADING CALCULATIONS

```

```

  IF (DX.NE.0.OR.DY.NE.0) GO TO 5
  HCG(I) = HDG(I-1)

```

```

565
570
575
580
585
590
595
1000
1005
1010
1015
1020
1025
1030
1035
1040
1045
1050
1055
1060
1065
1070
1075
1080
1085
1090
1095
1100
1105
1110
1115
1120
1125
1130
1135
1140
1145
1150
1155
1160
1165
1170
1175
1180
1185
1190
1195
1200

```





```

CC TO 6
5 HDG(I+1) = ATAN2(DY,DX)
  HDG(I) = HDG(2)
6 HCGDEG(I) = HDG(I)*57.29578
  IF (HCGDEG(I).LT.0) HDGDEG(I)=HDGCEG(I)+360
VELOCITY CALCULATIONS
  VEL(I) = CVEL
  VEL(I+1) = VEL(I)-TAN(CA(I))*DIST/100+(CVEL-VEL(I))*(DIST/VEL(I))/
130
BCMB RELEASE POINT CONSIDERATIONS
  IF (I.EQ.MBR) IBR = 1
  ***** RESTRICTION: MAX VEL PRIOR TO BOMB RELEASE POINT IS 260 MPS.
  IF (VEL(I+1).GT.260.AND.IBR.EQ.0) VEL(I+1)=260
  ***** RESTRICTION: MAX VEL AFTER BCMB RELEASE PCINT IS 310 MPS.
  IF (VEL(I+1).GT.310.AND.IBR.NE.0) VEL(I+1)=310
  VAVG = (VEL(I)+VEL(I+1))/2
VELOCITY COMPONENT CALCULATIONS
  ZDOT(I) = VEL(I)*SIN(CA(I))
  XYVEL = VEL(I)*COS(CA(I))
  XDOT(I) = XYVEL*COS(HDG(I))
  YDOT(I) = XYVEL*SIN(HDG(I))
MILESTONE TIME CALCULATIONS
  T(I) = 0
  T(I+1) = T(I)+DIST/VAVG
  DT(I) = 1
  IF (I.EQ.1) GO TO 7
  DT(I) = T(I)-T(I-1)
TURN RATE AND ROLL ANGLE CALCULATIONS
7 TNANG = HDG(I+1)-HDG(I)
  TNRT(I) = TNANG/DT(I)
  RA(I) = ATAN(TNRT(I)*VAVG/9.81)*57.29578
8 CONTINUE
9 CONTINUE

```



1445  
1450  
1455  
1460  
1465  
1470  
1475  
1480  
1485  
1490  
1495  
1500  
1505  
1510  
1515  
1520  
1525  
1530  
1535  
1540  
1545  
1550  
1555  
1560  
1565  
1570  
1575  
1580  
1585  
1590  
1595  
1600  
1605  
1610  
1615  
1620  
1625  
1630  
1635  
1640  
1645  
1650  
1655  
1660  
1665  
1670  
1675  
1680

CARD 2 TIME INCREMENT CALCULATION

TINC = T(MNUM)/1000

CARD 6 TIME INCREMENT CALCULATIONS

TINKI = 0

DO 10 I=1,9  
TINK(I) = TINKI+T(MNUM)/10  
TINKI = TINK(I)  
10 CONTINUE

////////\*\*\*\*\*PRINT PROGRAM\*\*\*\*\*////////

OPTION TO LIST THE POOL CARD DECK

IF (ILST.EQ.0) GO TO 16

COMMENCE PRINTED OUTPUT OF THE POOL CARD DECK.

THE JCL CARDS.

WRITE (6,47)  
WRITE (6,48)  
WRITE (6,49)  
WRITE (6,50)  
WRITE (6,51)  
WRITE (6,52)  
WRITE (6,53)  
WRITE (6,54)  
WRITE (6,55)  
WRITE (6,56)  
WRITE (6,57)  
WRITE (6,58)  
WRITE (6,59)  
WRITE (6,60)  
WRITE (6,61)  
WRITE (6,62)  
WRITE (6,63)  
WRITE (6,64)  
WRITE (6,65)  
WRITE (6,66)  
WRITE (6,67)  
WRITE (6,68)  
WRITE (6,69)  
WRITE (6,70)  
WRITE (6,71)  
WRITE (6,72)  
WRITE (6,73)  
WRITE (6,74)  
WRITE (6,75)  
WRITE (6,76)  
WRITE (6,77)  
WRITE (6,78)  
WRITE (6,79)  
WRITE (6,80)  
WRITE (6,81)  
WRITE (6,82)  
WRITE (6,83)  
WRITE (6,84)  
WRITE (6,85)  
WRITE (6,86)  
WRITE (6,87)  
WRITE (6,88)  
WRITE (6,89)  
WRITE (6,90)  
WRITE (6,91)  
WRITE (6,92)  
WRITE (6,93)  
WRITE (6,94)  
WRITE (6,95)  
WRITE (6,96)  
WRITE (6,97)  
WRITE (6,98)  
WRITE (6,99)  
WRITE (6,100)

BLANK CARD FOR RADAR MASK ANGLE = 0.



```

CC CC      WRITE (6,57)
              THE CUPUT TITLE CARD.
CC CC      WRITE (6,58)
              CARD 2
CC CC      WRITE (6,59) T(MNUM),TINC
              THE 2A CARDS (MILESTONES).
CC CC      DC 11 I=1,MNUM
              WRITE (6,60) T(I),X(I),Y(I),Z(I),XDOT(I),YDOT(I),ZDOT(I),+EGDEG(I)
              1,CADEG(I),RA(I)
              11 CONTINUE
CC CC      WRITE (6,61)
              WRITE (6,62)
              CARD 3 (GUN EMPLACEMENT CARD).
CC CC      WRITE (6,63) XGUN(1),YGUN(1),ZGUN(1)
              CARD 4 (GUN TYPE).
CC CC      WRITE (6,64)
              CARD 5
CC CC      WRITE (6,65)
              CARD 6
CC CC      WRITE (6,66) (TINK(I),I=1,9)
              CARD 7 (VULNERABLE AREA TABLE VS TYPE 1 AND 2 WEAPONS)
CC CC      WRITE (6,67)
              WRITE (6,68) (VATIN2(I),I=1,208)
CC CC      CARD 12 (EXECUTE RUN).
              EXTENDED OUTPUT OPTION
1685
1690
1695
1700
1705
1710
1715
1720
1725
1730
1735
1740
1745
1750
1755
1760
1765
1770
1775
1780
1785
1790
1795
1800
1805
1810
1815
1820
1825
1830
1835
1840
1845
1850
1855
1860
1865
1870
1875
1880
1885
1890
1895
1900
1905
1910
1915
1920

```





IF (IEXT.NE.1) WRITE (6,70)	1925
IF (IEXT.EQ.1) WRITE (6,69)	1930
	1935
THE REMAINDER OF THE CARDS INTRODUCE NEW GUN LOCATIONS, GUN TYPES	1940
AND VULNERABLE AREA TABLES TO BE EXECUTED BY THE PROGRAM.	1945
	1950
WRITE (6,63) XGUN(2),YGUN(2),ZGUN(2)	1955
	1960
EXTENDED OUTPUT OPTION	1965
	1970
IF (IEXT.NE.1) WRITE (6,70)	1975
IF (IEXT.EQ.1) WRITE (6,69)	1980
WRITE (6,63) XGUN(3),YGUN(3),ZGUN(3)	1985
WRITE (6,71)	1990
	1995
EXTENDED OUTPUT OPTION	2000
	2005
IF (IEXT.NE.1) WRITE (6,70)	2010
IF (IEXT.EQ.1) WRITE (6,69)	2015
WRITE (6,63) XGUN(4),YGUN(4),ZGUN(4)	2020
	2025
EXTENDED OUTPUT OPTION	2030
	2035
IF (IEXT.NE.1) WRITE (6,70)	2040
IF (IEXT.EQ.1) WRITE (6,69)	2045
WRITE (6,63) XGUN(5),YGUN(5),ZGUN(5)	2050
WRITE (6,72)	2055
	2060
CARD 7 (VULNERABLE AREA TABLE VS TYPE 3 WEAPONS)	2065
	2070
WRITE (6,147)	2075
WRITE (6,68) (VAT3(I),I=1,208)	2080
	2085
EW (JAMMER) OPTION	2090
	2095
IF (IEW.NE.1) GO TO 12	2100
IRECM = 1	2105
SJTMAX = 3	2110
	2115
CARD 14 (SPECIFIES EW OPTION AND JAMMER INFO.)	2120
	2125
WRITE (6,73) IEW,PJAM,IRECM,SJTMAX	2130
	2135
WRITE THE RADAR CROSS SECTION TABLE.	2140
	2145
WRITE (6,74) (RCSTAB(I),I=1,133)	2150
	2155
12 CONTINUE	2160



CC	EXTENDED OUTPUT OPTION		2165
CC		IF (IEXT.NE.1) WRITE (6,70)	2170
CC		IF (IEXT.EQ.1) WRITE (6,69)	2175
		WRITE (6,63) XGUN(6), YGUN(6), ZGUN(6)	2180
		WRITE (6,75)	2190
CC	MULTIPATH OPTION		2195
CC		IF (IMULT.NE.1) GO TO 13	2205
CC	CARD 13 (MULTIPATH EFFECTS)		2210
		IRMP = 1	2215
		WRITE (6,76) IMULT,IRMP	2220
C	13 CONTINUE		2225
CC			2230
CC	EXTENDED OUTPUT OPTION		2235
CC		IF (IEXT.NE.1) WRITE (6,70)	2240
		IF (IEXT.EQ.1) WRITE (6,69)	2245
		WRITE (6,63) XGUN(7), YGUN(7), ZGUN(7)	2250
		WRITE (6,77)	2255
CC	CARD 7 (VULNERABLE AREA TABLE VS TYPE 5 WEAPONS)		2260
CC		WRITE (6,148)	2265
		WRITE (6,68) (VAT5(I), I=1,208)	2270
CC	MULTIPATH OPTION		2275
CC		IF (IMULT.NE.1) GO TO 14	2280
CC	CARD 13 (MULTIPATH EFFECTS)		2285
		IRMP = 2	2290
		WRITE (6,76) IMULT,IRMP	2295
C	14 CCNTINUE		2300
CC			2305
CC	EW (JAMMER) OPTION		2310
CC		IF (IEW.NE.1) GO TO 15	2315
		IRECM = 2	2320
			2325
			2330
			2335
			2340
			2345
			2350
			2355
			2360
			2365
			2370
			2375
			2380
			2385
			2390
			2395
			2400



CC	ANTI-JAM OPTION	2405
CC	IF (IAJ.EQ.1) IRECM=3	2410
CC	IF (IRECM.EQ.2) SJTMX=1.5	2415
CC	IF (IRECM.EQ.3) SJTMX=17	2420
CC	CARD 14 (SPECIFIES EW OPTION AND JAMMER INFO.)	2425
CC	WRITE (6,73) IEW,PJAM,IRECM,SJTMX	2430
CC	WRITE THE RADAR CROSS SECTION TABLE.	2435
C	WRITE (6,74) (RCSTAB(I),I=1,133)	2440
CC	15 CCNTINUE	2445
CC	EXTENDED OUTPUT OPTION	2450
CC	IF (IEXT.NE.1) WRITE (6,70)	2455
CC	IF (IEXT.EQ.1) WRITE (6,69)	2460
CC	WRITE (6,61)	2465
CC	WRITE (6,78)	2470
CC	WRITE (6,61)	2475
CC	//////*****PUNCH PROGRAM*****//////	2480
CC	CPTCN TO PUNCH THE POOL CARD DECK	2485
CC	16 CCNTINUE	2490
CC	IF (IPNCH.EQ.0) GO TO 22	2500
CC	COMMENCE PUNCHED OUTPUT OF THE POOL CARD DECK.	2505
CC	THE JCL CARDS.	2510
CC	WRITE (7,79)	2515
CC	WRITE (7,80)	2520
CC	WRITE (7,81)	2525
CC	WRITE (7,82)	2530
CC	WRITE (7,83)	2535
CC	WRITE (7,84)	2540
CC	WRITE (7,83)	2545
CC	WRITE (7,85)	2550
CC	WRITE (7,83)	2555
CC	WRITE (7,83)	2560
CC	WRITE (7,83)	2565
CC	WRITE (7,83)	2570
CC	WRITE (7,83)	2575
CC	WRITE (7,83)	2580
CC	WRITE (7,83)	2585
CC	WRITE (7,83)	2590
CC	WRITE (7,83)	2595
CC	WRITE (7,83)	2600
CC	WRITE (7,83)	2605
CC	WRITE (7,83)	2610
CC	WRITE (7,83)	2615
CC	WRITE (7,83)	2620
CC	WRITE (7,83)	2625
CC	WRITE (7,83)	2630
CC	WRITE (7,83)	2635
CC	WRITE (7,83)	2640









C	CARD 7 (VULNERABLE AREA TABLE VS TYPE 1 AND 2 WEAPONS)	2885
C	WRITE (7,99)	2890
C	WRITE (7,100) (VATIN2(I),I=1,208)	2895
C	CARD 12 (EXECUTE RUN).	2900
C	EXTENDED OUTPUT OPTION	2905
C	IF (IEXT.NE.1) WRITE (7,102)	2910
C	IF (IEXT.EQ.1) WRITE (7,101)	2915
C	THE REMAINDER OF THE CARDS INTRODUCE NEW GUN LOCATIONS, GUN TYPES	2920
C	AND VULNERABLE AREA TABLES TO BE EXECUTED BY THE PROGRAM.	2925
C	WRITE (7,95) XGUN(2),YGUN(2),ZGUN(2)	2930
C	EXTENDED OUTPUT OPTION	2935
C	IF (IEXT.NE.1) WRITE (7,102)	2940
C	IF (IEXT.EQ.1) WRITE (7,101)	2945
C	WRITE (7,95) XGUN(3),YGUN(3),ZGUN(3)	2950
C	WRITE (7,103)	2955
C	EXTENDED OUTPUT OPTION	2960
C	IF (IEXT.NE.1) WRITE (7,102)	2965
C	IF (IEXT.EQ.1) WRITE (7,101)	2970
C	WRITE (7,95) XGUN(4),YGUN(4),ZGUN(4)	2975
C	EXTENDED OUTPUT OPTION	2980
C	IF (IEXT.NE.1) WRITE (7,102)	2985
C	IF (IEXT.EQ.1) WRITE (7,101)	2990
C	WRITE (7,95) XGUN(5),YGUN(5),ZGUN(5)	2995
C	WRITE (7,104)	3000
C	EXTENDED OUTPUT OPTION	3005
C	IF (IEXT.NE.1) WRITE (7,102)	3010
C	IF (IEXT.EQ.1) WRITE (7,101)	3015
C	WRITE (7,95) XGUN(6),YGUN(6),ZGUN(6)	3020
C	EXTENDED OUTPUT OPTION	3025
C	IF (IEXT.NE.1) WRITE (7,102)	3030
C	IF (IEXT.EQ.1) WRITE (7,101)	3035
C	WRITE (7,95) XGUN(7),YGUN(7),ZGUN(7)	3040
C	WRITE (7,105)	3045
C	EXTENDED OUTPUT OPTION	3050
C	IF (IEXT.NE.1) WRITE (7,102)	3055
C	IF (IEXT.EQ.1) WRITE (7,101)	3060
C	WRITE (7,95) XGUN(8),YGUN(8),ZGUN(8)	3065
C	WRITE (7,106)	3070
C	EXTENDED OUTPUT OPTION	3075
C	IF (IEXT.NE.1) WRITE (7,102)	3080
C	IF (IEXT.EQ.1) WRITE (7,101)	3085
C	WRITE (7,95) XGUN(9),YGUN(9),ZGUN(9)	3090
C	WRITE (7,107)	3095
C	EXTENDED OUTPUT OPTION	3100
C	IF (IEXT.NE.1) WRITE (7,102)	3105
C	IF (IEXT.EQ.1) WRITE (7,101)	3110
C	WRITE (7,95) XGUN(10),YGUN(10),ZGUN(10)	3115
C	WRITE (7,108)	3120



C CARD 14 (SPECIFIES EW OPTION AND JAMMER INFO.)

WRITE (7,105) IEW,PJAM,IREFM,SJTMX

WRITE THE RADAR CROSS SECTION TABLE.

WRITE (7,106) (RCSTAB(I),I=1,133)

18 CONTINUE

EXTENDED OUTPUT OPTION

IF (IEXT.NE.1) WRITE (7,102)

IF (IEXT.EQ.1) WRITE (7,101)

WRITE (7,95) XGUN(6),YGUN(6),ZGUN(6)

WRITE (7,107)

MULTIPATH OPTION

IF (IMULT.NE.1) GC TO 19

IRMP = 1

CARD 13 (MULTIPATH EFFECTS)

WRITE (7,108) IMULT,IRMP

19 CONTINUE

EXTENDED OUTPUT OPTION

IF (IEXT.NE.1) WRITE (7,102)

IF (IEXT.EQ.1) WRITE (7,101)

WRITE (7,95) XGUN(7),YGUN(7),ZGUN(7)

WRITE (7,109)

CARD 7 (VULNERABLE AREA TABLE VS TYPE 5 WEAPON)

WRITE (7,150)

WRITE (7,150) (VAT5(I),I=1,208)

MULTIPATH OPTION

IF (IMULT.NE.1) GC TO 20

IRMP = 2

CARD 13 (MULTIPATH EFFECTS)









```

C      REAL XTITLE/'/'
C      CALL AXIS (C.0,0.0,XTITLE,-1,9.C,C.0,0.0,2000.0)
C
C      ESTABLISH Y AXIS
C
C      REAL YTITLE/'/'
C      CALL AXIS (0.0,0.0,YTITLE,0,6.0,90.0,0.0,2000.0)
C
C      COMPLETE OUTLINE
C
C      REAL LX1(3)/0.0,9.0,9.0/
C      REAL LY1(3)/6.0,6.0,0.0/
C      CALL LINE (LX1,LY1,3,1,1)
C
C      PLOT THE ROAD
C
C      REAL RDX1(26)/0.0,0.5,1.0,1.5,2.0,2.5,3.0,3.5,4.0,4.5,5.0,5.5,5.75
C      1,6.0,6.5,6.86,7.0,7.2,7.3,7.4,7.5,7.6,7.7,7.8,C.8.5,9.C/
C      REAL RDY1(26)/2.75,2.82,2.88,2.92,2.96,3.0,3.06,3.1,3.15,3.2,3.25,3.3,3.35,3.4,3.45,3.5,3.55,3.6,3.65,3.7,3.75,3.8,3.85,3.9,3.95,4.0,4.05,4.1,4.15,4.2,4.25,4.3,4.35,4.4,4.45,4.5,4.55,4.6,4.65,4.7,4.75,4.8,4.85,4.9,5.0,5.05,5.1,5.15,5.2,5.25,5.3,5.35,5.4,5.45,5.5,5.55,5.6,5.65,5.7,5.75,5.8,5.85,5.9,6.0,6.05,6.1,6.15,6.2,6.25,6.3,6.35,6.4,6.45,6.5,6.55,6.6,6.65,6.7,6.75,6.8,6.85,6.9,7.0,7.05,7.1,7.15,7.2,7.25,7.3,7.35,7.4,7.45,7.5,7.55,7.6,7.65,7.7,7.75,7.8,7.85,7.9,8.0,8.05,8.1,8.15,8.2,8.25,8.3,8.35,8.4,8.45,8.5,8.55,8.6,8.65,8.7,8.75,8.8,8.85,8.9,9.0,9.05,9.1,9.15,9.2,9.25,9.3,9.35,9.4,9.45,9.5,9.55,9.6,9.65,9.7,9.75,9.8,9.85,9.9,10.0,10.05,10.1,10.15,10.2,10.25,10.3,10.35,10.4,10.45,10.5,10.55,10.6,10.65,10.7,10.75,10.8,10.85,10.9,11.0,11.05,11.1,11.15,11.2,11.25,11.3,11.35,11.4,11.45,11.5,11.55,11.6,11.65,11.7,11.75,11.8,11.85,11.9,12.0,12.05,12.1,12.15,12.2,12.25,12.3,12.35,12.4,12.45,12.5,12.55,12.6,12.65,12.7,12.75,12.8,12.85,12.9,13.0,13.05,13.1,13.15,13.2,13.25,13.3,13.35,13.4,13.45,13.5,13.55,13.6,13.65,13.7,13.75,13.8,13.85,13.9,14.0,14.05,14.1,14.15,14.2,14.25,14.3,14.35,14.4,14.45,14.5,14.55,14.6,14.65,14.7,14.75,14.8,14.85,14.9,15.0,15.05,15.1,15.15,15.2,15.25,15.3,15.35,15.4,15.45,15.5,15.55,15.6,15.65,15.7,15.75,15.8,15.85,15.9,16.0,16.05,16.1,16.15,16.2,16.25,16.3,16.35,16.4,16.45,16.5,16.55,16.6,16.65,16.7,16.75,16.8,16.85,16.9,17.0,17.05,17.1,17.15,17.2,17.25,17.3,17.35,17.4,17.45,17.5,17.55,17.6,17.65,17.7,17.75,17.8,17.85,17.9,18.0,18.05,18.1,18.15,18.2,18.25,18.3,18.35,18.4,18.45,18.5,18.55,18.6,18.65,18.7,18.75,18.8,18.85,18.9,19.0,19.05,19.1,19.15,19.2,19.25,19.3,19.35,19.4,19.45,19.5,19.55,19.6,19.65,19.7,19.75,19.8,19.85,19.9,20.0,20.05,20.1,20.15,20.2,20.25,20.3,20.35,20.4,20.45,20.5,20.55,20.6,20.65,20.7,20.75,20.8,20.85,20.9,21.0,21.05,21.1,21.15,21.2,21.25,21.3,21.35,21.4,21.45,21.5,21.55,21.6,21.65,21.7,21.75,21.8,21.85,21.9,22.0,22.05,22.1,22.15,22.2,22.25,22.3,22.35,22.4,22.45,22.5,22.55,22.6,22.65,22.7,22.75,22.8,22.85,22.9,23.0,23.05,23.1,23.15,23.2,23.25,23.3,23.35,23.4,23.45,23.5,23.55,23.6,23.65,23.7,23.75,23.8,23.85,23.9,24.0,24.05,24.1,24.15,24.2,24.25,24.3,24.35,24.4,24.45,24.5,24.55,24.6,24.65,24.7,24.75,24.8,24.85,24.9,25.0,25.05,25.1,25.15,25.2,25.25,25.3,25.35,25.4,25.45,25.5,25.55,25.6,25.65,25.7,25.75,25.8,25.85,25.9,26.0,26.05,26.1,26.15,26.2,26.25,26.3,26.35,26.4,26.45,26.5,26.55,26.6,26.65,26.7,26.75,26.8,26.85,26.9,27.0,27.05,27.1,27.15,27.2,27.25,27.3,27.35,27.4,27.45,27.5,27.55,27.6,27.65,27.7,27.75,27.8,27.85,27.9,28.0,28.05,28.1,28.15,28.2,28.25,28.3,28.35,28.4,28.45,28.5,28.55,28.6,28.65,28.7,28.75,28.8,28.85,28.9,29.0,29.05,29.1,29.15,29.2,29.25,29.3,29.35,29.4,29.45,29.5,29.55,29.6,29.65,29.7,29.75,29.8,29.85,29.9,30.0,30.05,30.1,30.15,30.2,30.25,30.3,30.35,30.4,30.45,30.5,30.55,30.6,30.65,30.7,30.75,30.8,30.85,30.9,31.0,31.05,31.1,31.15,31.2,31.25,31.3,31.35,31.4,31.45,31.5,31.55,31.6,31.65,31.7,31.75,31.8,31.85,31.9,32.0,32.05,32.1,32.15,32.2,32.25,32.3,32.35,32.4,32.45,32.5,32.55,32.6,32.65,32.7,32.75,32.8,32.85,32.9,33.0,33.05,33.1,33.15,33.2,33.25,33.3,33.35,33.4,33.45,33.5,33.55,33.6,33.65,33.7,33.75,33.8,33.85,33.9,34.0,34.05,34.1,34.15,34.2,34.25,34.3,34.35,34.4,34.45,34.5,34.55,34.6,34.65,34.7,34.75,34.8,34.85,34.9,35.0,35.05,35.1,35.15,35.2,35.25,35.3,35.35,35.4,35.45,35.5,35.55,35.6,35.65,35.7,35.75,35.8,35.85,35.9,36.0,36.05,36.1,36.15,36.2,36.25,36.3,36.35,36.4,36.45,36.5,36.55,36.6,36.65,36.7,36.75,36.8,36.85,36.9,37.0,37.05,37.1,37.15,37.2,37.25,37.3,37.35,37.4,37.45,37.5,37.55,37.6,37.65,37.7,37.75,37.8,37.85,37.9,38.0,38.05,38.1,38.15,38.2,38.25,38.3,38.35,38.4,38.45,38.5,38.55,38.6,38.65,38.7,38.75,38.8,38.85,38.9,39.0,39.05,39.1,39.15,39.2,39.25,39.3,39.35,39.4,39.45,39.5,39.55,39.6,39.65,39.7,39.75,39.8,39.85,39.9,40.0,40.05,40.1,40.15,40.2,40.25,40.3,40.35,40.4,40.45,40.5,40.55,40.6,40.65,40.7,40.75,40.8,40.85,40.9,41.0,41.05,41.1,41.15,41.2,41.25,41.3,41.35,41.4,41.45,41.5,41.55,41.6,41.65,41.7,41.75,41.8,41.85,41.9,42.0,42.05,42.1,42.15,42.2,42.25,42.3,42.35,42.4,42.45,42.5,42.55,42.6,42.65,42.7,42.75,42.8,42.85,42.9,43.0,43.05,43.1,43.15,43.2,43.25,43.3,43.35,43.4,43.45,43.5,43.55,43.6,43.65,43.7,43.75,43.8,43.85,43.9,44.0,44.05,44.1,44.15,44.2,44.25,44.3,44.35,44.4,44.45,44.5,44.55,44.6,44.65,44.7,44.75,44.8,44.85,44.9,45.0,45.05,45.1,45.15,45.2,45.25,45.3,45.35,45.4,45.45,45.5,45.55,45.6,45.65,45.7,45.75,45.8,45.85,45.9,46.0,46.05,46.1,46.15,46.2,46.25,46.3,46.35,46.4,46.45,46.5,46.55,46.6,46.65,46.7,46.75,46.8,46.85,46.9,47.0,47.05,47.1,47.15,47.2,47.25,47.3,47.35,47.4,47.45,47.5,47.55,47.6,47.65,47.7,47.75,47.8,47.85,47.9,48.0,48.05,48.1,48.15,48.2,48.25,48.3,48.35,48.4,48.45,48.5,48.55,48.6,48.65,48.7,48.75,48.8,48.85,48.9,49.0,49.05,49.1,49.15,49.2,49.25,49.3,49.35,49.4,49.45,49.5,49.55,49.6,49.65,49.7,49.75,49.8,49.85,49.9,50.0,50.05,50.1,50.15,50.2,50.25,50.3,50.35,50.4,50.45,50.5,50.55,50.6,50.65,50.7,50.75,50.8,50.85,50.9,51.0,51.05,51.1,51.15,51.2,51.25,51.3,51.35,51.4,51.45,51.5,51.55,51.6,51.65,51.7,51.75,51.8,51.85,51.9,52.0,52.05,52.1,52.15,52.2,52.25,52.3,52.35,52.4,52.45,52.5,52.55,52.6,52.65,52.7,52.75,52.8,52.85,52.9,53.0,53.05,53.1,53.15,53.2,53.25,53.3,53.35,53.4,53.45,53.5,53.55,53.6,53.65,53.7,53.75,53.8,53.85,53.9,54.0,54.05,54.1,54.15,54.2,54.25,54.3,54.35,54.4,54.45,54.5,54.55,54.6,54.65,54.7,54.75,54.8,54.85,54.9,55.0,55.05,55.1,55.15,55.2,55.25,55.3,55.35,55.4,55.45,55.5,55.55,55.6,55.65,55.7,55.75,55.8,55.85,55.9,56.0,56.05,56.1,56.15,56.2,56.25,56.3,56.35,56.4,56.45,56.5,56.55,56.6,56.65,56.7,56.75,56.8,56.85,56.9,57.0,57.05,57.1,57.15,57.2,57.25,57.3,57.35,57.4,57.45,57.5,57.55,57.6,57.65,57.7,57.75,57.8,57.85,57.9,58.0,58.05,58.1,58.15,58.2,58.25,58.3,58.35,58.4,58.45,58.5,58.55,58.6,58.65,58.7,58.75,58.8,58.85,58.9,59.0,59.05,59.1,59.15,59.2,59.25,59.3,59.35,59.4,59.45,59.5,59.55,59.6,59.65,59.7,59.75,59.8,59.85,59.9,60.0,60.05,60.1,60.15,60.2,60.25,60.3,60.35,60.4,60.45,60.5,60.55,60.6,60.65,60.7,60.75,60.8,60.85,60.9,61.0,61.05,61.1,61.15,61.2,61.25,61.3,61.35,61.4,61.45,61.5,61.55,61.6,61.65,61.7,61.75,61.8,61.85,61.9,62.0,62.05,62.1,62.15,62.2,62.25,62.3,62.35,62.4,62.45,62.5,62.55,62.6,62.65,62.7,62.75,62.8,62.85,62.9,63.0,63.05,63.1,63.15,63.2,63.25,63.3,63.35,63.4,63.45,63.5,63.55,63.6,63.65,63.7,63.75,63.8,63.85,63.9,64.0,64.05,64.1,64.15,64.2,64.25,64.3,64.35,64.4,64.45,64.5,64.55,64.6,64.65,64.7,64.75,64.8,64.85,64.9,65.0,65.05,65.1,65.15,65.2,65.25,65.3,65.35,65.4,65.45,65.5,65.55,65.6,65.65,65.7,65.75,65.8,65.85,65.9,66.0,66.05,66.1,66.15,66.2,66.25,66.3,66.35,66.4,66.45,66.5,66.55,66.6,66.65,66.7,66.75,66.8,66.85,66.9,67.0,67.05,67.1,67.15,67.2,67.25,67.3,67.35,67.4,67.45,67.5,67.55,67.6,67.65,67.7,67.75,67.8,67.85,67.9,68.0,68.05,68.1,68.15,68.2,68.25,68.3,68.35,68.4,68.45,68.5,68.55,68.6,68.65,68.7,68.75,68.8,68.85,68.9,69.0,69.05,69.1,69.15,69.2,69.25,69.3,69.35,69.4,69.45,69.5,69.55,69.6,69.65,69.7,69.75,69.8,69.85,69.9,70.0,70.05,70.1,70.15,70.2,70.25,70.3,70.35,70.4,70.45,70.5,70.55,70.6,70.65,70.7,70.75,70.8,70.85,70.9,71.0,71.05,71.1,71.15,71.2,71.25,71.3,71.35,71.4,71.45,71.5,71.55,71.6,71.65,71.7,71.75,71.8,71.85,71.9,72.0,72.05,72.1,72.15,72.2,72.25,72.3,72.35,72.4,72.45,72.5,72.55,72.6,72.65,72.7,72.75,72.8,72.85,72.9,73.0,73.05,73.1,73.15,73.2,73.25,73.3,73.35,73.4,73.45,73.5,73.55,73.6,73.65,73.7,73.75,73.8,73.85,73.9,74.0,74.05,74.1,74.15,74.2,74.25,74.3,74.35,74.4,74.45,74.5,74.55,74.6,74.65,74.7,74.75,74.8,74.85,74.9,75.0,75.05,75.1,75.15,75.2,75.25,75.3,75.35,75.4,75.45,75.5,75.55,75.6,75.65,75.7,75.75,75.8,75.85,75.9,76.0,76.05,76.1,76.15,76.2,76.25,76.3,76.35,76.4,76.45,76.5,76.55,76.6,76.65,76.7,76.75,76.8,76.85,76.9,77.0,77.05,77.1,77.15,77.2,77.25,77.3,77.35,77.4,77.45,77.5,77.55,77.6,77.65,77.7,77.75,77.8,77.85,77.9,78.0,78.05,78.1,78.15,78.2,78.25,78.3,78.35,78.4,78.45,78.5,78.55,78.6,78.65,78.7,78.75,78.8,78.85,78.9,79.0,79.05,79.1,79.15,79.2,79.25,79.3,79.35,79.4,79.45,79.5,79.55,79.6,79.65,79.7,79.75,79.8,79.85,79.9,80.0,80.05,80.1,80.15,80.2,80.25,80.3,80.35,80.4,80.45,80.5,80.55,80.6,80.65,80.7,80.75,80.8,80.85,80.9,81.0,81.05,81.1,81.15,81.2,81.25,81.3,81.35,81.4,81.45,81.5,81.55,81.6,81.65,81.7,81.75,81.8,81.85,81.9,82.0,82.05,82.1,82.15,82.2,82.25,82.3,82.35,82.4,82.45,82.5,82.55,82.6,82.65,82.7,82.75,82.8,82.85,82.9,83.0,83.05,83.1,83.15,83.2,83.25,83.3,83.35,83.4,83.45,83.5,83.55,83.6,83.65,83.7,83.75,83.8,83.85,83.9,84.0,84.05,84.1,84.15,84.2,84.25,84.3,84.35,84.4,84.45,84.5,84.55,84.6,84.65,84.7,84.75,84.8,84.85,84.9,85.0,85.05,85.1,85.15,85.2,85.25,85.3,85.35,85.4,85.45,85.5,85.55,85.6,85.65,85.7,85.75,85.8,85.85,85.9,86.0,86.05,86.1,86.15,86.2,86.25,86.3,86.35,86.4,86.45,86.5,86.55,86.6,86.65,86.7,86.75,86.8,86.85,86.9,87.0,87.05,87.1,87.15,87.2,87.25,87.3,87.35,87.4,87.45,87.5,87.55,87.6,87.65,87.7,87.75,87.8,87.85,87.9,88.0,88.05,88.1,88.15,88.2,88.25,88.3,88.35,88.4,88.45,88.5,88.55,88.6,88.65,88.7,88.75,88.8,88.85,88.9,89.0,89.05,89.1,89.15,89.2,89.25,89.3,89.35,89.4,89.45,89.5,89.55,89.6,89.65,89.7,89.75,89.8,89.85,89.9,90.0,90.05,90.1,90.15,90.2,90.25,90.3,90.35,90.4,90.45,90.5,90.55,90.6,90.65,90.7,90.75,90.8,90.85,90.9,91.0,91.05,91.1,91.15,91.2,91.25,91.3,91.35,91.4,91.45,91.5,91.55,91.6,91.65,91.7,91.75,91.8,91.85,91.9,92.0,92.05,92.1,92.15,92.2,92.25,92.3,92.35,92.4,92.45,92.5,92.55,92.6,92.65,92.7,92.75,92.8,92.85,92.9,93.0,93.05,93.1,93.15,93.2,93.25,93.3,93.35,93.4,93.45,93.5,93.55,93.6,93.65,93.7,93.75,93.8,93.85,93.9,94.0,94.05,94.1,94.15,94.2,94.25,94.3,94.35,94.4,94.45,94.5,94.55,94.6,94.65,94.7,94.75,94.8,94.85,94.9,95.0,95.05,95.1,95.15,95.2,95.25,95.3,95.35,95.4,95.45,95.5,95.55,95.6,95.65,95.7,95.75,95.8,95.85,95.9,96.0,96.05,96.1,96.15,96.2,96.25,96.3,96.35,96.4,96.45,96.5,96.55,96.6,96.65,96.7,96.75,96.8,96.85,96.9,97.0,97.05,97.1,97.15,97.2,97.25,97.3,97.35,97.4,97.45,97.5,97.55,97.6,97.65,97.7,97.75,97.8,97.85,97.9,98.0,98.05,98.1,98.15,98.2,98.25,98.3,98.35,98.4,98.45,98.5,98.55,98.6,98.65,98.7,98.75,98.8,98.85,98.9,99.0,99.05,99.1,99.15,99.2,99.25,99.3,99.35,99.4,99.45,99.5,99.55,99.6,99.65,99.7,99.75,99.8,99.85,99.9,100.0,100.05,100.1,100.15,100.2,100.25,100.3,100.35,100.4,100.45,100.5,100.55,100.6,100.65,100.7,100.75,100.8,100.85,100.9,101.0,101.05,101.1,101.15,101.2,101.25,101.3,101.35,101.4,101.45,101.5,101.55,101.6,101.65,101.7,101.75,101.8,101.85,101.9,102.0,102.05,102.1,102.15,102.2,102.25,102.3,102.35,102.4,102.45,102.5,102.55,102.6,102.65,102.7,102.75,102.8,102.85,102.9,103.0,103.05,103.1,103.15,103.2,103.25,103.3,103.35,103.4,103.45,103.5,103.55,103.6,103.65,103.7,103.75,103.8,103.85,103.9,104.0,104.05,104.1,104.15,104.2,104.25,104.3,104.35,104.4,104.45,104.5,104.55,104.6,104.65,104.7,104.75,104.8,104.85,104.9,105.0,105.05,105.1,105.15,105.2,105.25,105.3,105.35,105.4,105.45,105.5,105.55,105.6,105.65,105.7,105.75,105.8,105.85,105.9,106.0,106.05,106.1,106.15,106.2,106.25,106.3,106.35,106.4,106.45,106.5,106.55,106.6,106.65,106.7,106.75,106.8,106.85,106.9,107.0,107.05,107.1,107.15,107.2,107.25,107.3,107.35,107.4,107.45,107.5,107.55,107.6,107.65,107.7,107.75,107.8,107.85,107.9,108.0,108.05,108.1,108.15,108.2,108.25,108.3,108.35,108.4,108.45,108.5,108.55,108.6,108.65,108.7,108.75,108.8,108.85,108.9,109.0,109.05,109.1,109.15,109.2,109.25,109.3,109.35,109.4,109.45,109.5,109.55,109.6,109.65,109.7,109.75,109.8,109.85,109.9,110.0,110.05,110.1,110.15,110.2,110.25,110.3,110.35,110.4,110.45,110.5,110.55,110.6,110.65,110.7,110.75,110.8,110.85,110.9,111.0,111.05,111.1,111.15,111.2,111.25,111.3,111.35,111.4,111.45,111.5,111.55,111.6,111.65,111.7,111.75,111.8,111.85,111.9,112.0,112.05,112.1,112.15,112.2,112.25,112.3,112.35,112.4,112.45,112.5,112.55,112.6,112.65,112.7,112.75,112.8,112.85,112.9,113.0,113.05,113.1,113.15,113.2,113.25,113.3,113.35,113.4,113.45,113.5,113.55,113.6,113.65,113.7,113.75,113.8,113.85,113.9,114.0,114.05,114.1,114.15,114.2,114.25,114.3,114.35,114.4,114.45,114.5,114.55,114.6,114.65,114.7,114.75,114.8,114.85,114.9,115.0,115.05,115.1,115.15,115.2,115.25,115.3,115.35,115.4,115.45,115.5,115.55,115.6,115.65,115.7,115.75,115.8,115.85,115.9,116.0,116.05,116.1,116.15,116.2,116.25,116.3,116.35,116.4,116.45,116.5,116.55,116.6,116
```



```

165,3.6,3.5,3.35,3.3,3.15,3.3,3.5,4.0,4.15,4.25,4.2,4.0,3.8/
CALL LINE (RVX2,RVY2,27,1,1)
REAL RVX3(11)/6.85,6.9,6.85,7.0,7.35,7.5,7.7,8.0,8.4,8.83,9.0/
CALL RVY3(11)/3.6,3.35,3.0,2.6,2.3,2.25,2.2,1.65,1.3,1.0,0.8/
CALL LINE (RVX3,RVY3,11,1,1)
REAL RVX4(7)/7.23,7.3,7.3,7.5,8.0,8.5,9.0/
REAL RVY4(7)/3.9,3.7,3.35,3.0,2.6,2.1,1.7/
CALL LINE (RVX4,RVY4,7,1,1)

C
C
C
PLOT THE BIG ISLAND
REAL BIX1(12)/7.84,8.0,8.14,8.31,8.4,8.38,8.2,8.0,7.85,7.83,7.85,7
1.84/
REAL BIY1(12)/2.3,2.22,2.18,1.8,1.7,1.63,1.68,1.82,2.0,2.1,2.2,2.3
1/
CALL LINE (BIX1,BIY1,12,1,1)

C
C
C
PLOT THE XY AXIS ARROWS
REAL XYX1(9)/0.4,0.35,0.45,0.4,0.4,1.0,0.8,C.8,1.0/
REAL XYX1(9)/1.0,0.8,0.8,1.0,0.4,0.45,0.35,0.4/
CALL LINE (XYX1,XYX1,9,1,1)
REAL XCHAR(1)/X,/
CALL SYMBOL (0.8,0.1,0.21,XCHAR,0.0,1)
REAL YCHAR(1)/Y,/
CALL SYMBOL (0.1,0.8,0.21,YCHAR,0.0,1)

C
C
C
PLOT THE TRUE NORTH ARROW
REAL TNX1(5)/2.0,2.0,1.95,2.05,2.0/
REAL TNY1(5)/4.8,5.4,5.2,5.4/
CALL LINE (TNX1,TNY1,5,1,1)
REAL TNCHAR(1)/N,/
CALL SYMBOL (1.9,5.5,0.21,TNCHAR,0.0,1)

C
C
C
WRITE THE PLOT TITLE
REAL PTITLE(6)/AE','3251','POC','1 SC','ENAR','IO ' /
CALL SYMBOL (2.3,6.5,0.21,PTITLE,0.0,24)

C
C
C
PLOT THE MILESTONES AND FLIGHT PATH
CALL LINE (X10,Y10,MNUM,1,7)

C
C
C
PLOT THE BOMB RELEASE POINT
RX = X10(MBR)
RY = Y10(MBR)

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4075 CALL LINE (RX,RY,1,1,6)
4080
4085 PLOT THE GUN LOCATIONS AND RANGE RADIUS
4090
4095
4100
4105
4110
4115
4120
4125
4130
4135
4140
4145
4150
4155
4160
4165
4170
4175
4180
4185
4190
4195
4200
4205
4210
4215
4220
4225
4230
4235
4240
4245
4250
4255
4260
4265
4270
4275
4280
4285
4290
4295
4300
4305
4310

CALL LINE (RX,RY,1,1,6)

PLOT THE GUN LOCATIONS AND RANGE RADIUS

C C C C C

DC 24 I=1,7
TIMIX = XGUN(I)/2000.0
TIMIY = YGUN(I)/2000.0
IF (I.GE.1) MKR = 3
IF (I.GE.3) MKR = 4
IF (I.GE.5) MKR = 5
IF (I.GE.7) MKR = 2
IF (I.GE.1) RAD = 0.78
IF (I.GE.3) RAD = 0.91
IF (I.GE.5) RAD = 1.42
IF (I.GE.7) RAD = 3.52
CALL LINE (TIMIX,TIMIY,1,1,MKR)

C C C

DO 23 J=1,25
XCIRC(J) = TIMIX+RAD*COS(J*PI/12)
YCIRC(J) = TIMIY+RAD*SIN(J*PI/12)
IF (XCIRC(J).LT.0) XCIRC(J)=0
IF (YCIRC(J).LT.0) YCIRC(J)=0
IF (XCIRC(J).GT.9) XCIRC(J)=9
IF (YCIRC(J).GT.6) YCIRC(J)=6
23 CONTINUE

C C C

CALL LINE (XCIRC,YCIRC,25,1,MKR)
24 CONTINUE

C C C

CALL PLOT (0.0,12.0,-3)
CALL PLOTE
25 CONTINUE

C C C C C
/////***** ERROR CHECK SECTION *****/////
CPTICN SUMMARY
WRITE (6,111) MNUM,T(MNUM),MBR
WRITE (6,112)
WRITE (6,113) CVEL

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IZMAX = 0
IF (DISTGT.GT.6000.AND.Z(I).GT.457) IZMAX=1
IF (IZMAX.NE.1) GO TO 26
IERR = 1
WRITE (6,132) I,Z(I)

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```

***** RESTRICTION: MIN ALT IS 61 METERS.

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26 IZMIN = 0
IF (Z(I).LT.61) IZMIN=1
IF (IZMIN.NE.1) GO TO 27
IERR = 1
WRITE (6,133) I,Z(I)

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***** RESTRICTION: MAX ALT OVERALL IS 2134 METERS.

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```

27 IZMAX = 0
IF (Z(I).GT.2134) IZMAX=1
IF (IZMAX.NE.1) GO TO 28
IERR = 1
WRITE (6,134) I,Z(I)

```

```

***** RESTRICTION: MIN POP UP ALT IS 1219 METERS.

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```

28 CCNTINUE
IF (DISTGT.GT.6000) GO TO 29
IF (Z(I).GT.POPALT) POPALT=Z(I)
IPOP = 0
IF (I.EQ.MBR.AND.POPALT.LT.1219) IPOP=1
IF (IPOP.NE.1) GO TO 29
IERR = 1
WRITE (6,135) POPALT

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```

***** RESTRICTION: ACFT HEADING MUST BE WITHIN 5 DEGREES OF THE
CENTER OF THE BRIDGE DURING THE LEG PRIOR TO BCMB RELEASE POINT.

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29 CCNTINUE
IF (I.NE.MBR) GO TO 33
DX = XTGT-X(I)
DY = YTGT-Y(I)
TGTHDG = ATAN2(DY,DX)*57.29578
IF (TGTHDG.LT.0) TGTHDG=TGTHDG+360
HDGLMT = ABS(HDGDEG(I)-TGTHDG)
IAIM = 0
IF (HDGLMT.GT.5) IAIM=1
IF (IAIM.NE.1) GO TO 30
IERR = 1
WRITE (6,136) HDGCEG(I),TGTHDG,FDGLMT

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4600  
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4645  
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4680  
4685  
4690  
4695  
4700  
4705  
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4755  
4760  
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4790





4795  
4800  
4805  
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4985  
4990  
4995  
5000  
5005  
5010  
5015  
5020  
5025  
5030



C C C C C C C C C

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35 CONTINUE
    IF (IERR.EQ.1) GO TO 36
    WRITE (6,142)
36 CONTINUE
    IF (IERR.NE.1) GO TO 37
    WRITE (6,143)
37 CCNTINUE
    CCNTINUE (6,144)

    GO TO 39
38 WRITE (6,46)
39 CONTINUE
////***** FORMAT STATEMENTS *****/////

    STOP

40 FCRMAT (3F10.0)
41 FCRMAT (F10.0,I2,8I1,F10.0)
42 FCRMAT (1X,THE JAM FUNCTION IS SPECIFIED, BUT THE JAMMER POWER ',
43 1,IS SPECIFIED AS ZERO.',/1X,THE JAM FUNCTION HAS BEEN ',
44 2,TURNED OFF.',/1X,THE SPECIFIED JAMMER POWER IS GREATER THAN 1000 ',
45 1,WATTS AND HAS BEEN LIMITED TO 1000 WATTS.',/1X,THE ANTI-JAM FUNCTION IS SPECIFIED; HOWEVER, THE ANTI-JAM FEATURE HAS ',
46 2,BEEN TURNED OFF.',/1X,THE ANTI-JAM FEATURE HAS ',
47 1,INPUT DATA; HOWEVER, EITHER NO GUN EMPLACEMENT',/1X,DATA IS ',
48 2,PART OF THE INPUT OR ALL TERMINATES.',
49 3,EXEC PGM=PIEW,REGICN=200K')
47 FCRMAT (1X,STEPLIB DD DSN=F0559.PIEW,UNIT=3330,',
48 1,VOL=SER=DISK02,DISP=SHR',)
49 1,LRCL=133,BLKSIZE=3325',)
50 1,LRCL=133,BLKSIZE=3325',)
51 FCRMAT (1X,DCB=(RECFM=VBS,LRECL=404,BLKSIZE=3236),)
52 FCRMAT (1X,DCB=(RECFM=VBS,LRECL=404,BLKSIZE=3236),)
53 FCRMAT (1X,DCB=(RECFM=VBS,LRECL=404,BLKSIZE=3236),)
54 FCRMAT (1X,DCB=(RECFM=VBS,LRECL=404,BLKSIZE=3236),)

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55 FCRMAT (1X, '//FT11F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)),')
56 FCRMAT (1X, '//GO, FT05F001 DD *')
57 FCRMAT (1X, '//GO, FT05F001 DD *')
58 FCRMAT (1X, '01 AIRCRAFT COMBAT SURVIVABILITY SCENARIO')
59 FCRMAT (1X, '02, 4X, 12, 8X, F7.2, 1X, F7.4)
60 FCRMAT (1X, 10(F7.1, 1X))
61 FCRMAT (1X, '//*')
62 FCRMAT (1X, '//GO, FT05F002 DD *')
63 FCRMAT (1X, '03, 6X, 3(1X, F7.3))
64 FCRMAT (1X, '04 11111')
65 FCRMAT (1X, '05, 5X, 11.0')
66 FCRMAT (1X, '06, 3X, 1 9, 9(F7.3, 1X))
67 FCRMAT (1X, '07 VULNERABLE AREA TABLE VS TYPE 1 AND 2 WEAPONS')
68 FCRMAT (1X, 8F8.3)
69 FCRMAT (1X, 1211111111)
70 FCRMAT (1X, 12)
71 FCRMAT (1X, '04 211111')
72 FCRMAT (1X, '04 34411')
73 FCRMAT (1X, '14, 13, 2X, 5 0 1.0, 7X, F6.1, 4X, 1.0E-06, 6X, 1, 1X,
1 1.0, 6X, 15, F10.2, /1X, GEND, /1X, 3X, 19 7 90.0 180.0,
100.0)
74 FCRMAT (1X, 8F10.3, /1X, 3F10.3)
75 FCRMAT (1X, '04 33411')
76 FCRMAT (1X, '13, 13, 15, 0.35')
77 FCRMAT (1X, '04 53211')
78 FCRMAT (1X, '//GO, FT05F003 DD *')
79 FCRMAT (1X, 'EXEC PGM=PIEW, REGION=200K')
80 FCRMAT (1X, '//STEPLIB DD DSN=F05559.PIEW, UNIT=3330, ,
1 VOL=SER=DISK02, DISP=SHR, )
81 FCRMAT (1X, '//FT06F001 DD SYSOUT=A, DCB=(RECFM=FBA, ,
1 ECL=133, BLKSIZE=3325), )
82 FCRMAT (1X, '//GO, FT04F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)), )
83 FCRMAT (1X, 'DCB=(RECFM=VBS, LRECL=404, BLKSIZE=3236), )
84 FCRMAT (1X, '//GO, FT07F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)), )
85 FCRMAT (1X, '//GO, FT08F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)), )
86 FCRMAT (1X, '//GO, FT09F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)), )
87 FCRMAT (1X, '//FT11F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1)), )
88 FCRMAT (1X, '//GO, FT05F001 DD *')
89 FCRMAT (1X, '01 AIRCRAFT COMBAT SURVIVABILITY SCENARIO')
90 FCRMAT (1X, '02, 4X, 12, 8X, F7.2, 1X, F7.4)
91 FCRMAT (1X, 10(F7.1, 1X))
92 FCRMAT (1X, '//*')
93 FCRMAT (1X, '//GO, FT05F002 DD *')
94 FCRMAT (1X, '03, 6X, 3(1X, F7.0))
95 FCRMAT (1X, '04 11111')
96 FCRMAT (1X, '05, 5X, 11.0')
97 FCRMAT (1X, '06, 3X, 1 9, 9(F7.3, 1X))

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'LR









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135 FORMAT (1X, 'MAX ALTITUDE DURING PCP UP WAS ', F6.1, ' METERS WHICH',
1      ' IS LESS THAN THE MINIMUM POP UP ALTITUDE', /1X,
136      ' OF 1219 METERS.', ///)
137 FORMAT (1X, 'THE AIRCRAFT HEADING INTO THE BCMB RELEASE POINT IS ',
1      ' F5.1, ' THE HEADING TO THE TARGET IS ', F5.1, ' /1X,
2      ' THE DIFFERENCE IS ', F5.1, ' WHICH IS GREATER THAN THE ',
3      ' 5 DEGREE MAXIMUM DIFFERENCE LIMIT.', ///)
138 FORMAT (1X, 'THE LENGTH OF THE LEG IMMEDIATELY PRIOR TO THE BCMB ',
1      ' RELEASE POINT IS ', F4.2, ' SECONDS', /1X, 'IN DURATION ',
2      ' WHICH IS LESS THAN THE MINIMUM OF 2 SECONDS.', ///)
139 FORMAT (1X, 'THE BCMB RELEASE ALTITUDE IS ', F7.1, ' METERS WHICH IS',
1      ' NOT IN THE BOMB', ///)
140 FORMAT (1X, 'THE BCMB WAS RELEASED AT A DISTANCE OF ', F7.1,
1      ' METERS FROM THE TARGET WHICH IS IN EXCESS', /1X, ' OF THE 1000 ',
2      ' METER BOMB RELEASE MAXIMUM RANGE.', ///)
141 FORMAT (1X, 'MILESTONE ', I3, ' VELOCITY PER SECOND. ', F6.1, ' METERS PER', /1X
2      ' SECOND. CLIMB STALL OCCURS AT 90 METERS', I3, ' DECREASE', /1X
3      ' THE CLIMB ANGLE PRIOR TO MILESTONE ', I3, ' IN A TURN RATE OF ', F5.1, '
4      ' MILESTONE ', I3, ' TURN RESULTS IN A G LOADING', /1X, ' O
5      ' DEGREES PER SECOND WHICH RESULTS IN A G MAX LOADING', /1X, ' F5.
6      ' THE TURN ANGLE AT MILESTONE ', I3, ' TC BELOW ', F5.
7      ' DEGREES.', ///)
142 FORMAT (1X, '***** NO FLIGHT PATH ERRORS IN THIS RUN *****', ///)
143 FORMAT (1X, '***** NO FURTHER FLIGHT PATH ERRORS *****', ///)
144 FORMAT (1X, '***** END OF POOL INPUT PROGRAM - SUMMARY COMPLETE',
1      ' *****', ///)
145 FCRMAT (1X, 'THE EXTENDED OUTPUT OPTION IS NOT SPECIFIED.')
146 FCRMAT (1X, 'EXTENDED PRINTOUT IS PROVIDED AS OUTPUT.')
147 FCRMAT (1X, '07 VULNERABLE AREA TABLE VS TYPE 3 WEAPONS')
148 FCRMAT (1X, '07 VULNERABLE AREA TABLE VS TYPE 5 WEAPONS')
149 FCRMAT (1X, '07 VULNERABLE AREA TABLE VS TYPE 3 WEAPONS')
150 FCRMAT (1X, '07 VULNERABLE AREA TABLE VS TYPE 5 WEAPON')
      END

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5755  
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P001 PROGRAM LISTING (IBM)

164





```

1  COMMON VXFPA(1201),VXFPA(1201),VYFPA(1201),VZFPA(1201)
   ICARD(20),PTOTTF(10),PTOTTF(10)
   COMMON SPKTOI(32,8),IPRINT(6),IFLAGS(4)
   COMMON PKTTDC(9),PKTIDC(10,9),PKTFDC(10,9)
   COMMON INUNIT
   DIMENSION TEMP(16,6),SPKT(8,4,8),SPKT2(32,8)
   EQUIVALENCE (SPKT2(1,1),SPKT(1,1,1),TEMP(1,1))

   SOME EQUIVALENCES REMOVED BY B.E.E. BY CARRYING TWO VARIABLES
   THROUGH PROGRAM WITH SAME VALUES FOR CLARITY.

   DATA ESVPCT/0.10/
   DATA SD2J/0./
   DATA ILOOP/-1/
   INUNIT = 5
   IFLAGS(1) = 0
   IFLAGS(2) = 0
   IFLAGS(3) = 0
   IFLAGS(4) = 0
   CALL REREAD
   CALL ERRSET(208,256,-1,1,1,207)
   ASSIGN 9996 TO IERR
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C  IIIII  N  N  IIIII  TTTT  IIIII  A  A  L  IIIII  ZZZZZ  EEEEE  C
C  I  I  N  N  N  I  I  T  I  A  A  L  I  I  ZZZZZ  E  C
C  I  I  N  N  N  I  I  T  I  A  A  L  I  I  ZZZZZ  EEE  C
C  I  I  N  N  N  I  I  T  I  A  A  L  I  I  ZZZZZ  E  C
C  IIIII  N  N  IIIII  T  IIIII  A  A  L  IIIII  ZZZZZ  EEEEE  C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
READ(INUNIT,1050) ISW,AMASK
AMASKI=AMASK*57.3
PRINT 38,AMASKI
38  FORMAT(5X,25HMASK ANGLE FOR THIS RUN =,F6.3,5H DEG.)
1050  FORMAT(A2,8X,F10.5)
95  ISL=1
   IMUL = 0
   IJAM = 0
   SD2RJ = 0.
   DO 96 J=1,9
   PKTTDC(J)=0.0
   DO 96 I=1,10
   PKTIDC(I,J)=0.0
   PKTFDC(I,J)=0.0
96  DO 94 I=1,32
   DO 94 J=1,8

```







```

RMIN =RANMIN(IGT)
RMAX =RANMAX(IGT)
VMIN=VELMIN(IGT)
VMAX=VELMAX(IGT)
IG=1
LINE=66
IF (IPRINT(6).LE.0) GO TO 60
CALL PAGES(5,0,JP)
WRITE (6,1013) ISL,IGT,IEM,XGUN,YGUN,ZGUN,CIRCLE
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
TTTTT RRRR A A CCC C K K
T R R A A C C K K
T RRRR A A C C K K
T R R AAAAA C C K K
R R A A CCC K K
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
60 CALL INTERP(TIME/DTFPA)
X=GETVAL(XFPA)-XGUN
Y=GETVAL(YFPA)-YGUN
Z=GETVAL(ZFPA)-ZGUN
VX=GETVAL(VXFPA)
VY=GETVAL(VYFPA)
VZ=GETVAL(VZFPA)
ILOOP = ILOOP+1
RCL = GETVAL(PFPA)
PIT = GETVAL(AFPA)
HDG = GETVAL(BFPA)
G2=X*X+Y*Y
G=SQRT(G2)
TFET=ATAN2(Y,X)
PHIT=ATAN2(Z,G)
IF MULTIPATH HAS BEEN SPECIFIED(IMUL=1) AND THE ELEVATION
ANGLE IS MEASURED BY RADAR(IOEM=3), COMPUTE THE ELEVATION
TRACKING BIAS(PBMP),VARIANCE(SP2MP),AND APPARENT
ALTITUDE(Z).
SP2MP = 0.
PBMP = ).
IF(IMUL.NE.1 .OR. IOEM.NE.3) GO TO 30
CALL MULTPTH(IRMP,REFC,PHIT,PBMP,SP2MP)
PHIT = PHIT+PBMP
Z = G*TAN(PHIT)

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30  CGCONTINUE
   R = SQRT(G2+Z*Z)
   RD=(X*VX+Y*VY+Z*VZ)/R
   TD=(X*VY-Y*VX)/G2
   PD=(VZ-Z*RD/R)/G
   IF(TIME.GT.TMIN) GO TO 58
   RDD = 0.0
   TCD = 0.0
   PCD = 0.0
   RANS=R
   THES=THET
   PHIS=PHIT
   ERAN2 = 0.0
   ERAN3 = 0.0
   ERAN4 = 0.0
   ETHE2 = 0.0
   ETHE3 = 0.0
   ETHE4 = 0.0
   EPHI2 = 0.0
   EPHI3 = 0.0
   EPHI4 = 0.0
   GO TO 59
58  RCC=(RD-RDS)//.064
   TDD=(TD-TDS)//.064
   PDD=(PD-PDS)//.064
   (STORE PREVIOUSLY OBSERVED MEAN TRACKING ERRORS FOR USE IN MEAN
    TRACKING ERROR EQUATIONS)
59  ERAN1=ERAN2
   ERAN2=ERAN3
   ERAN3=ERAN4
   ERAN4=R-RANS
   ERAN=ERAN1+.71875*(ERAN2-ERAN1)
   ETHE1=ETHE2
   ETHE2=ETHE3
   ETHE3=ETHE4
   ETHE4=((G/R)*ANGLIM(THET-THES)
   ETHE=ETHE1+.71875*(ETHE2-ETHE1)
   EPHI1=EPHI2
   EPHI2=EPHI3
   EPHI3=EPHI4
   EPHI4=PHIT-PHIS
   EPHI=EPHI1+.71875*(EPHI2-EPHI1)
   CHECK MASK ANGLE
   IF(PHIT.LE.AMASK) TFIRE= TIME+ TREACT+TTRACK
C
C
C   (SKIP FIRE ATTEMPT IF INSUFFICIENT TRACKING TC FIRE)

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C      IF(TIME.LE.TFIRE)GO TO 62
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C      FFFF IIIII RRRR RRRR EEEEE
C      F      I      R      E
C      FFFF      I      RRRR EEEE
C      F      I      R      E
C      F      IIIII R      R      EEEEE
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C      VG=SQRT(VX*VX+VY*VY)
C      V =SQRT(VG*VG+VZ*VZ)
C      PSI=ANGLIM(PFPA(INDEX1))+FRACT*ANGLIM(PFPA(INDEX2))-PFPA(INDEX1))
C      (SKIP FIRE ATTEMPT IF MAX ALLOWED TRACKING ERROR IS EXCEEDED)
C
54  IF(ABS(ETHE4).GT.ETMAX)GO TO 64
    IF(ABS(EPHI4).GT.EPMAX)GO TO 64
    IF(IDEM.GT.1)GO TO 56
    (LIMIT INPUT RANGE ESTIMATE)
    RC=AMAX1(RMIN,AMIN1(RMAX,RANS-0.575*RD))
    COMPUTE MEAN ASSUMED TIME OF FIRE AIRCRAFT POSITION (MECHANICAL
    COMPUTATION)
    XF=RC*CTBCPB-XG(IG)
    YF=RC*STBCPB-YG(IG)
    ZF=RC*SPB
    GF=SQRT(XF*XF+YF*YF)
    RF=SQRT(GF*GF+ZF*ZF)
    (SET UP MATRIX T, THE TRANSFORMATION BETWEEN THE LINE OF SIGHT
    SYSTEM AND THE FALSE HORIZON SYSTEM)
    T22 = X/G
    CT = X/G
    ST=Y/G
    T33 = G/R
    CP = G/R
    T13 = Z/R
    SP = Z/R
    CS=COS(PSI)
    SS=SIN(PSI)
    CA=VG/V
    SA=VZ/V

```



```

CG=VX/VG
SG=VY/VG
T11=CT*CP
T12=ST*CP
T21=-ST
T31=-CT*SP
T32=-ST*SP

      (SET UP FALSE HORIZON SYSTEM VELOCITY COMPONENTS)
      VXP=T11*VX+T12*VY+T13*VZ
      VYP=T21*VX+T22*VY
      VZP=T31*VX+T32*VY+T33*VZ
      VGP=SQRT(VXP*VXP+VYP*VYP)
      CAP=VGP/V
      SAP=VZP/V
      CBP=VXP/VGP
      SBP=VYP/VGP

      (SET UP UNIT VECTOR OUT LEFT WING OF AIRCRAFT)
      UX=-SA*CG*SS-SG*CS
      UY=CG*CS-SA*SG*SS
      UZ=CA*SS
      IF(VXP)31,32,31
      CSP=-T11*UX-T12*UY-T13*UZ
      GO TO 33
31 CSP=(VGP*(T21*UX+T22*UY)+UZP*VZP*SBP)/VXP
33 SSP=UZP/CAP

      (COMPUTE FALSE HORIZON SYSTEM MEAN AND STANDARD DEVIATION OF
      ERROR IN DIVE AND COURSE ANGLE ESTIMATES)
      EMAP=SAP*(.3196*ABS(CBP)-.1859*ABS(SBP))
      ESAP=.04712+.08063*ABS(SAP)*(1.0+1.16*ABS(CBP))
      EMBP=.4060*CAP*SBP*CBP
      ESBP=(.1670-.08098*ABS((CBP*CBP-SBP*SBP)*CSP))/CAP
1 SEMAP=SIN(EMAP)
CEMAP=CCS(EMAP)
SEMBP=SIN(EMBP)
CEMBP=COS(EMBP)
      THE NEXT CARD ELIMINATES AN EQUIVALENCE BY USING A DOUBLE
      REPLACEMENT.
      A33 = SAP*CEMAP + CAP*SEMAP
      SABP= SAP*CEMAP + CAP*SEMAP
      CABP=CAP*CEMAP-SAP*SEMAP

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```

CC      SBP=SBP*CEMBP+CBP*SEMBP
CC      CBBP=CBP*CEMBP-SBP*SEMB
      (LIMIT VELOCITY ASSESSMENT (MECHANICAL COMPUTERS))
      VBP=AMIN1(VMAX,AMAX1(VMIN,V))
      ESVP=ESVPCT*V
      SET UP THE ELEMENTS OF THE MATRIX A.
      A CONTAINS THE PARTIALS OF VXE,VYE,VZE W.R.T. ALPHA,BETA,SPEED

      A31=CABP*CBBP
      A32=CABP*SB8P
      A21=-VBP*A32
      A22=VBP*A31
      A11=-VBP*SABP*CBBP
      A12=-VBP*SABP*SB8P
      A13=VBP*CABP
      COMPUTE MEAN ESTIMATED VELOCITY CCMPONENTS (MECHANICAL
      COMPUTATION)
      VXE=(A31*T11+A32*T21+A33*T31)*VBP
      VYE=(A31*T12+A32*T22+A33*T32)*VBP
      VZE=(A31*T13
      +A33*T33)*VBP
      GO TO 63

      COMPUTE MEAN ASSUMED TIME OF FIRE AIRCRAFT POSITION (ELECTRONIC
      COMPUTATION)
56      XF=RANS*CTBCPB
      YF=RANS*STBCPB
      ZF=RANS*SPB
      RF=RANS*CPB
      RF=RANS
      ITERATION TO DETERMINE MEAN THEORETICAL INTERCEPT POINT
CC
CC
63      RS=0.0
      VS=VMUZZ
      T=0.0
21      XE=XF+VXE*T
      YE=YF+VYE*T
      ZE=ZF+VZE*T
      XE2=XE*YE
      YE2=YE*YE
      ZE2=ZE*ZE
      GE2=XE2+YE2

```



```

RE2=GE2+ZE2
RE=SQRT(RE2)
RC=RE-RS
IF(RC.LT.1.0)GO TO 22
VC=VS-(XE*VXE+YE*VYE+ZE*VZE)/RE
IF(VD.LE.1.0)GO TO 64
T=T+RC/VD
IF(T.GT.TTFMAX)GO TO 64
RS=RSHELL(T)
VS=VSHELL(T)
GC TO 21
T2=T#T
22
C
C
C
C
CHANGE 22 JAN 76
IF INTERCEPT POINT BELOW MASK*****SKIP FIRE
GE= SQRT(GE2)
IF(ATAN2(ZE,GE).LE. AMASK) GO TO 64
ITERATION TO DETERMINE ACTUAL INTERCEPT POSITION, RANGE, AND TIME
TU=AMIN1(TFMAX,TMAX-TIME)
23 CALL RPLANE(TU)
IF(RSHELL(TU).GT.RA)GO TO 24
C
C
C
C
(SKIP FIRE ATTEMPT IF SHELL CANNOT CATCH AIRCRAFT)
IF((XA*GETVAL(VXFPA)+YA*GETVAL(VYFPA)+ZA*GETVAL(VZFPA))/RA .LT.
1 VSHELL(TU))GO TO 64
TU=TU-1.0
IF(TU)64,64,23
24 TL=0.0
25 T=0.5*(TL+TU)
CALL RPLANE(T)
RC=RA-RSHELL(T)
IF(RC.GT.1.0)GO TO 26
IF(RC.GT.-1.0)GO TO 37
TL=T
GC TO 25
26 TL=T
GC TO 25
37 Q0=VS*RE-XE*VXE-YE*VYE-ZE*VZE
Q1=(VZE-VS*ZE/RE)/Q0
Q2=(XE*VYE-YE*VXE)/Q0
C
C
C
COMPUTE THE PARTIAL DERIVATIVES OF BIG THETA
DTDX=Q2*XE-YE

```



```

C C C
DITDY=Q2*YE+XE
DIIDZ=Q2*ZE
DIIDR=(ZF*DITDZ+ YF*DTTIDY+XF*DTIIDX)/RF
DIIDI=XF*DTIIDX-YF*DTIIDX
DIIDP= GF*DTIDZ-(YF*DTTIDY+XF*DTIIDX)*ZF/GF
COMPUTE THE PARTIAL DERIVATIVES OF BIG PHI
DPPDX=Q1*XE
DPPDY=Q1*YE
DPPDZ=Q1*ZE+1.0
DPPDR=(ZF*DPPDZ+ YF*DPPDY+XF*DPPDX)/RF
DPPDI=XF*DPPDY-YF*DPPDX
DPPDP= GF*DPPDZ-(YF*DPPDY+XF*DPPDX)*ZF/GF
GE4=GE2*GE2
GC TO (210,220,230,240),IOEM
C C C
COMPUTATIONS FOR MODE 1 OPERATION
210 GO TO (211,212,213,214,215,999),IGT
TRACKING ERROR DISTRIBUTION SIZES (SPHERICAL COORDINATES)
(FOR GT 1, 2, OR 3)
C C C C C
211 CONTINUE
212 CONTINUE
213 SR2=(123.0+0.0225*R)**2
SI2=(.0643*TD)**2
SP2=(.1320*PD)**2
GO TO 219
C C C
(FOR GT 4 AND 5)
214 CONTINUE
215 SR2=(123.0+0.0225*R)**2
SI2=(0.0167-.000710/(.0517+ABS(TD)))**2
SP2=(0.0116-.000216/(.0235+ABS(ABS(PD)-4.0*PDD)))**2
C C C
SET UP THE ELEMENTS OF THE MATRIX B=AT
219 B11=A11*T11+A12*T21+A13*T31
B12=A11*T12+A12*T22+A13*T32
B13=A11*T13 +A13*T33
B21=A21*T11+A22*T21
B22=A21*T12+A22*T22
B23=A21*T13
B31=A31*T11+A32*T21+A33*T31
B32=A31*T12+A32*T22+A33*T32

```









```

245 CONTINUE
246 SR2=(17.0+0.24*ABS(RDD)+0.018*RDD**2+SC2RJ
      ST2=(0.000982+0.1681*TD**2
      SP2=(0.000491+0.033*ABS(ABS(PD)-4.0*POD))**2+SP2MP
C
65 RBTID=RANS*THESD
   RBPID=RANS*PHISD
C
C
C VELOCITY COMPONENT ERROR DISTRIBUTION SIZES
C
SVX2=(SR2*(PHISD*CTBSPB+THESD*STBCPB)**2
1   +ST2*(RBPID*STBSPB-RBTID*CTBSPB-RANS*STBCPB)**2
2   +SP2*(RBPID*CTBSPB-RBTID*STBSPB+RANS*CTBSPB)**2)*ATLCON
SVY2=(SR2*(PHISD*STBSPB-THESD*CTBSPB)**2
1   +ST2*(RBPID*CTBSPB+RBTID*STBSPB-RANS*CTBSPB)**2
2   +SP2*(RBPID*STBSPB+RBTID*CTBSPB+RANS*STBSPB)**2)*ATLCON
SVZ2=(SR2*(PHISD*CPB)**2+SP2*(RBPID*SPB-RANS*CPB)**2)*ATLCON
C
C COMPUTE THE VARIANCES OF BIG THETA AND BIG PHI
C
STT2=((DTIDR**2)*SR2+(DTIDT**2)*ST2+(DTIDP**2)*SP2
1   +((DTIDX**2)*SVX2+(DTIDY**2)*SVY2+(DTIDZ**2)*SVZ2)*T2)/GE4
1+SD2J
SPP2=((DPPDR**2)*SR2+(DPPDT**2)*ST2+(DPPDP**2)*SP2
1   +((DPPDX**2)*SVX2+(DPPDY**2)*SVY2+(DPPDZ**2)*SVZ2)*T2)/GE2
1+SD2J
C
C COMPUTATION OF VULNERABLE AREA OF AIRCRAFT AT INTERCEPT
C
29 VP=VSHELL(T)
   XU=XE/RE
   YU=YE/RE
   ZU=ZE/RE
   XE=XU*RA
   YE=YU*RA
   ZE=ZU*RA
   GE=SQRT(XE*XE+YE*YE)
   VXA=GETVAL(VXFPA)
   VYA=GETVAL(VYFPA)
   VZA=GETVAL(VZFPA)
   VGA=SQRT(VXA*VXA+VYA*VYA)
   VA =SQRT(VGA*VGA+VZA*VZA)
   VXI=VP*XU-VXA
   VYI=VP*YU-VYA
   VZI=VP*ZU-VZA
   VI=SQRT(VXI*VXI+VYI*VYI+VZI*VZI)
   ALFA=GETVAL(AFPA)
   CA=COS(ALFA)

```



```

SA=SIN(ALFA)
BETA=BFPA(INDEX1)+FRACT*ANGLIM(BFPA(INDEX2))-BFPA(INDEX1))
CG=COS(BETA)
SG=SIN(BETA)
PZI=PFPA(INDEX1)+FRACT*ANGLIM(PFPA(INDEX2))-PFPA(INDEX1))
THE NEXT CARDS ELIMINATE AN EQUIVALENCE BY USING A DOUBLE
REPLACEMENT.

```

C C

```

T33 = COS(PZI)
CP = COS(PZI)
T13 = SIN(PZI)
SP = SIN(PZI)
Q1=VXI*CG+VYI*SG
Q2=VZI*CA-QI*SA
Q3=VYI*CG-VXI*SG
VXF=Q1*CA+VZI*SA
VYF=Q2*SP+Q3*CP
VZF=Q2*CP-Q3*SP

```

C C C (SET UP INDICES FOR VULNERABLE AREA INTERPOLATION)

```

F1=ATAN2(VYF,VXF)/QTRPI
IF(F1.LT.0.0)F1=F1+8.0
I1=F1
F1=F1-FLOAT(I1)
I1=I1+1
F2=ARCCOS(VZF/VI)/QTRPI
I2=F2
F2=F2-FLOAT(I2)
I2=I2+1
F3=AMIN1(7.999999999,VI/152.4)
I3=F3
F3=F3-FLOAT(I3)
I3=I3+1
C1=1.0-F1
D2=1.0-F2
D3=1.0-F3
J1=I1+1
J2=I2+1
J3=I3+1

```

C C C

(PERFORM LINEAR THREE DIMENSIONAL INTERPOLATION)

```

AVT=D3*(D2*(D1*VAT(I1,I2,I3)+F1*VAT(J1,I2,I3))+
1      F2*(D1*VAT(I1,J2,I3)+F1*VAT(J1,J2,I3))+
2      F3*(D2*(D1*VAT(I1,I2,J3)+F1*VAT(J1,I2,J3))+
3      F2*(D1*VAT(I1,J2,J3)+F1*VAT(J1,J2,J3)))

```

C C C SET UP DISTRIBUTION SIZES OF OTHER SOURCES OF RANDOM ERROR





```

SVA=XU*VXA+YU*VYA+ZU*VZA
CVA2=VA*VA-SVA*SVA
VMQ=.99*VMUZZ/RA-ASHCON
DTI=(VMQ-SQRT((VMQ*VMQ-4.0*BSSHCON)))/(2.0*BSSHCON)-T
SLXMV2=CVA2*(DTI*VP/(VP-SVA/.99))**2
SLYFR2=(0.010*VA*T)**2
SLXFR2=SLYFR2*(1.0+CVA2/(VP-SVA)**2)
SAOAP2=(0.003*RA)**2
SAOGJ2=(0.005*RA)**2
SAOBD2=(BDACON(IGT)*RA)**2
IF(10EM.EQ.1)GO TO 68
SAOPE2=(0.002*RA)**2
GO TO 67
68 SAOPE2=(V*V-((X*VX+Y*VY+Z*VZ)/R)**2)*
RA2*(0.0001463-7.478E-11*(R-1386.0)**2)**2
67 CCIST=SAOAP2+SAOGJ2+SAOPE2+SAOBD2
COMBINE ALL ERRORS INTO CNE DISTRIBUTION, COMPUTE BIAS
SXA2=STT2*RA2
SYA2=SPP2*RA2
SXL2=CDIST+SLXMV2+SLXFR2
SYL2=CDIST+SLYFR2
CIT=XE/GE
CIT=YE/GE
CPP=GE/RE
SPP=ZE/RE
BXA=XASTT-YA*CTT
BYA=ZA*CPP-(YA*STT+XA*CTT)*SPP
BXA2=BXA*BXA
BYA2=BYA*BYA
VAM=VXA*STT-VYA*CTT
VAP=VZA*CPP-(VYA*STT+VXA*CTT)*SPP
VAM2=VAM*VAM
VAP2=VAP*VAP
VAI2=VAM2+VAP2
CD2=VAM2/VAI2
SD2=VAP2/VAI2
SXA12=SXA2+CD2*SXL2+SD2*SYL2
SYA12=SYA2+CD2*SYL2+SD2*SXL2
TWOCOV=2.0*VAM*VAP*(SXL2-SYL2)/VAI2
DIF=SXA12-SYA12
DEN=2.0*SQRT((TWOCOV*TWOCOV+DIF*DIF)
HC2Z=DIF/DEN
CZ2Z=0.5+HC2Z
SZCZ=TWOCOV/DEN

```



```

STUFF=2.0*SZCZ*BXA*BYA
BXF2=CZ2*BXA2+SZ2*BYA2+STUFF
BYF2=CZ2*BYA2+SZ2*BXA2-STUFF
SXF2=CZ2*SYAT2+SZ2*SYAT2+SZCZ*TWOCOV
SYF2=CZ2*SYAT2+SZ2*SYAT2-SZCZ*TWOCOV
AVTPI=AVT/PI2

CC COMPUTE PROBABILITY OF KILL
CC
STUFF=BXF2/(SXF2+AVTPI)+BYF2/(SYF2+AVTPI)
IF(STUFF.LT.50.0)GO TO 75
PK=0.0
GO TO 78
75 PK=AMIN1(1.0,EXP(-.5*STUFF)*AVTPI/SQRT((SXF2+AVTPI)*(SYF2+AVTPI)))
78 PS=(1.0-PK)**15B
PK=1.0-PS
TI=TIME+T

CC ACCUMULATE PK AS A FUNCTION OF INPUT TIME INTERVALS
CC
I=0
I=I+1
IF(TIME-GE.TINTER(I))GO TO 50
J=I
51 IF(TI.LT.TINTER(J))GO TO 52
J=J+1
GO TO 51
52 PTOTTF(I)=PK+PS*PTOTTF(I)
PTOTTI(J)=PK+PS*PTOTTI(J)
CPS=CPS*PS

CC ACCUMULATE PK FOR EACH SPHERICAL SECTOR
CC
SPKT(I1,I2,I3)=PK+PS*SPKT(I1,I2,I3)

CC COMPUTE QUANTITIES FOR EXTENDED OUPUT, WHEN DESIRED
CC
IF(IPRINT(6).LE.0)GO TO 20
O1=THESD*DEGREE
O2=PHISD*DEGREE
O3=ETHE4*DEGREE
C4=EPHI4*DEGREE
***** ABS(BXF2,BYF2,SXF2,SYF2) WERE ADDED BELCW AS A TEMPORARY
***** MEASURE TO PRECLUDE NEGATIVE ARGUMENTS FOR A SQRT FUNCTION.
***** CAUSE OF NEGATIVE ARGUMENT: POSSIBLE ACCURACY DIFFERENCES
***** BETWEEN THE CDC AND IBM TYPE COMPUTERS.
***** CHANGE MADE BY LCDR C. SWENSON ON 3 MAR 1978.
BKF2 = ABS(BXF2)

```

















```

3F7.2,2F9.5)
1044 FORMAT(IX,F7.2,4X,F8.0,2X,F9.2,5X,F7.2,5X,F7.2,
15X,I2,3X,E10.4,5X,E10.4,5X,F7.2)
15 CALL S15
69 CALL S69
999 CALL S999
8888 CALL S8888
9994 CALL S9994
9995 CALL S9995
9996 CALL S9996
9997 CALL S9997
7777 CONTINUE
END

```

CCCC

SUBROUTINE TOOBIG WAS CONSTRUCTED FROM A PORTION OF THE ORIGINAL POOL  
MAIN PROGRAM IN ORDER TO ENABLE PROPER COMPILATION OF THE MAIN.

```

SUBROUTINE TOOBIG (TEMP,SPKT,SPKT2)
COMMON/BLOCK1/ITITLE(20)
COMMON/BLOCK2/NFPA,TMIN,TMAX,DTFPA
COMMON/BLOCK3/XGUN,YGUN,ZGUN
COMMON/BLOCK4/IGT,IEM,ICB,ISB,IGL,CIRCLE
COMMON/BLOCK5/NRHOS,RHO(9)
COMMON/BLOCK6/NTINTS,TINTER(10)
COMMON/BLOCK7/IVACCM(20),VAT(9,5,9)
COMMON/BLOCK8/TREACT,TRACK1,TRACK2
COMMON/BLOCK9/TROUND(6),THDMAX(6),PHDMAX(6),PHIMIN(6),PHIMAX(6),
VELMIN(6),VELMAX(6),RANMIN(6),RANMAX(6),
ATLAG(6),ETHMAX(6),EPHMAX(6),RMODES(6),
COMMON/BLOCKA/TFMAX1(6),TFMAX2(6),RVACON(6),RVBCON(6),VMUZEL(6)
COMMON/CONSTS/DEGREE,RADIAN,PI,PI2,QTRPI,SQRT2
COMMON/HEADFO/LINE,NUMBER
COMMON/NFPA/PA/ARM/XA,YA,ZA,RA2,RA,TIME
COMMON/IGXGYG/IG,XG(8),YG(8)
COMMON/MAGIC /FRACT,INDEX1,INDEX2
COMMON/VASBS/VMUZZ,ASHCON,BSHCON,CQUAD
COMMON/BUDGET/BDACON(6)
COMMON/CECM1/IRECM,IJ,GAINJ,IX,XSEC,CALX,PJW,
X,Y,Z,ROL,PIT,PDG,
FTGT,FJAM,GJ,SJT,SN
COMMON/NEWA/VY1,VY,ALFA,J,IRMP,PLEN,O1,O8,D1,JJJ,XR,ZT,PZI,IERR
COMMON/NEWB/Y1,P2,VX,BETA,IF6,IF5,IJAM,ISL,O4,CPS,TPERS,JMCODE,PSI,K
COMMON/NEWC/CP,X2,P1,B2,JFILE,C3,CPK,NROUND,I,XI,TM,SP,T1
COMMON/NEWD/T33,X1,Z2,B1,VX2,C3,IF5,IEOF,YR,IF2,T13,IFILE,Y2,A1
COMMON/NEWE/Z1,A2,VX1,VZ2,PHI,IF5,IF9,SD2RJ,SD2RJM,V1,VY2,F,JP,IF7,REFC
COMMON/NEWF/V2,VZ1,V,FUZZ,IF9,SD2RJ,SD2RJM,V1,VY2,F,JP,IF7,REFC
COMMON/NEWG/SJTMAX,O2,PK,D2,ISW

```

\*\*









```

PZI=PSI*RADIAN
T13 = SIN(PZI)
SP = SIN(PZI)
T33 = COS(PZI)
CP = COS(PZI)
LINE=66
IF(JMODE)5,5,1
1  ASSIGN 4 TO IEOF
  ASSIGN 3 TO IERR
  IF(JMODE.GT.IFILE)GO TO 2
  REMIND 9
  IFILE=1
  GO TO 4
2  IFILE=IFILE+1
3  READ(9,ERR=9992,END=9993)
  GO TO 3
4  IF(JMODE.GT.IFILE)GO TO 2
  ASSIGN 9999 TO IECF
  ASSIGN 28 TO IERR
  READ(9,ERR=9992,END=9993)
28 ASSIGN 9996 TO IERR
  JMODE=6
5  T1=T2
  X1=X2
  Y1=Y2
  Z1=Z2
  P1=P2
  A1=A2
  B1=B2
  V1=V2
  VX1=VX2
  VY1=VY2
  VZ1=VZ2
  IF(JMODE)6,6,7
6  READ(INUNIT,1000,ERR=9992,END=9993)T2,X,Y,Z,VX,VY,VZ2,B2,A2,P2
  B2=B2*RADIAN
  A2=A2*RADIAN
  P2=P2*RADIAN
  V2=SQRT(VX*VX+VY*VY+VZ2*VZ2)
  GO TO 9
7  JMODE=JMODE+1
  IF(JMODE.LE.6)GO TO 8
  JMODE=1
8  READ(9,ERR=9992,END=9993)TEMP
  T2 =TEMP( 1,JMODE)
  X =TEMP( 2,JMODE)
  Y =TEMP( 3,JMODE)
  Z =TEMP( 4,JMODE)

```



```

VX =TEMP( 5,JMODE)
VY =TEMP( 6,JMODE)
VZ2=TEMP( 7,JMODE)
VZ =TEMP(11,JMODE)
BZ =TEMP(13,JMODE)
A2 =TEMP(14,JMODE)
P2 =TEMP(15,JMODE)
9  X2=XT+(X-XR)*CP+(Y-YR)*SP
   Y2=YI+(Y-YR)*CP-(X-XR)*SP
   Z2=ZI+Z
   VX2=VX*CP+VY*SP
   VY2=VY*CP-VX*SP
   B2=ANGLIM(B2-PZI)
   T2=T2-TMIN
10  IF(TM.GT.T2)GO TO 5
   F=(TM-T1)/(T2-T1)
   NFPA=NFPA+1
   XFPA(NFPA)=X1+F*(X2-X1)
   YFPA(NFPA)=Y1+F*(Y2-Y1)
   ZFPA(NFPA)=Z1+F*(Z2-Z1)
   VXFPA(NFPA)=VX1+F*(VX2-VX1)
   VYFPA(NFPA)=VY1+F*(VY2-VY1)
   VZFPA(NFPA)=VZ1+F*(VZ2-VZ1)
   V=V1+F*(V2-V1)
   BFPA(NFPA)=ANGLIM(B1+F*ANGLIM(B2-B1))
   AFPA(NFPA)=A1+F*(A2-A1)
   PFPA(NFPA)=ANGLIM(P1+F*ANGLIM(P2-P1))
   K=K-1
   IF(K)34,34,35
34  K=KMODE
   PHI=DEGREE*PFPA(NFPA)
   BETA=DEGREE*BFPA(NFPA)
   ALFA=DEGREE*AFPA(NFPA)
   CALL PAGES(1,2,JP)
   IF(JP.EQ.0)WRITE(6,1004)TM,XFPA(NFPA),YFPA(NFPA),ZFPA(NFPA),
1  WRITE(6,1004)TM,XFPA(NFPA),YFPA(NFPA),VXFPA(NFPA),VFPA(NFPA),
   TM=DTFPA*FLOAT(NFPA)
35  IF(TM.LE.TMAX)GO TO 10
   TMX=TM-DTFPA-FUZZ
   CALL PAGES(4,0,JP)
   WRITE(6,1005)XR,YR,XT,YT,PSI,ZT
   CALL TPLOT(NFPA)
   IF(JMODE.GT.0)OR. INUNIT.EQ.8)GO TO 12
   ASSIGN 12 TC IEOF
13  READ(INUNIT,1000,ERR=9992,END=9993)
   GC TO 13

```

C





```

C DECODE DATA BLOCK 03 -- WEAPON LOCATION
C
103 READ (99,1008) XGUN,YGUN,ZGUN
C GO TO 12
C
C DECODE DATA BLOCK 04 -- WEAPON TYPE, MODE, NUMBER OF BARRELS (CYCLIC
C AND SIMULTANEOUS), NUMBER OF WEAPONS PER
C LOCATION, RADIUS OF CIRCLE OF WEAPON COMPLEX
C
104 READ (99,1009) IGT,IEM,ICB,ISB,IGL,CIRCLE
61 IF(IGL-1)9998,61,66
61 XG(1)=0.0
YG(1)=0.0
GO TO 12
66 DC 16 I=1,IGL
F=PI2*FLOAT(I)/FLOAT(IGL)
XG(I)=CIRCLE*COS(F)
16 YG(I)=CIRCLE*SIN(F)
GO TO 12
C
C DECODE DATA BLOCK 05 -- WEAPON DENSITY FACTORS
C
105 READ (99,1015) IF5,NRHOS,(RFO(I),I=1,NRHOS)
C
C DECODE DATA BLOCK 06 -- PK ACCRUAL TIME INTERVALS
C
106 READ (99,1015) IF6,NTINTS,(TINTER(I),I=1,NTINTS)
NTINTS=NTINTS+1
TINTER(NTINTS)=999.99
GO TO 12
C
C DECODE DATA BLOCK 07 -- AIRCRAFT VULNERABLE AREAS
C
107 DC 11 I=1,20
11 IVACOM(I)=ICARD(I)
READ(INUNIT,1000,ERR=9992,END=9993)(VAT(1,1,K),K=2,9)
DC 88 J=2,4
DC 89 I=1,8
89 READ(INUNIT,1000,ERR=9992,END=9993)(VAT(I,J,K),K=2,9)
CONTINUE
DC 88 K=2,9
88 VAT(9,J,K)=VAT(1,J,K)
READ(INUNIT,1000,ERR=9992,END=9993)(VAT(1,5,K),K=2,9)
DC 18 K=2,9
DC 18 I=2,9
VAT(I,5,K)=VAT(1,5,K)
18 VAT(I,1,K)=VAT(1,1,K)

```



```

IF7=1
GO TO 12
C
C DECODE DATA BLOCK 08 -- WEAPON REACTION AND TRACK TIMES
C
108 READ (99,1008) TREAT,TRACK1,TRACK2
GO TO 12
C
C DECODE DATA BLOCK 09 -- WEAPON PARAMETERS
C
109 READ (99,1008) TROUND(IGT),TFDMAX(IGT),PHDMAX(IGT),
1 PHIMIN(IGT),PHIMAX(IGT),VELMIN(IGT),VELMAX(IGT),
2 RANMIN(IGT),RANMAX(IGT)
READ(INUNIT,1000,ERR=9992,END=9993)ATLAG(IGT),ETHMAX(IGT),
1 EPHMAX(IGT),RMODES(IGT)
IF9=1
GO TO 12
C
C DECODE DATA BLOCK 10 -- SHELL PARAMETERS
C
110 READ (99,1008) TFMAX1(IGT),TFMAX2(IGT),RVACON(IGT),
1 RVBCON(IGT),VMUZEL(IGT)
IF9=1
GO TO 12
C
C DECODE DATA BLOCK 11 -- INPUT OPTION (CARD/TAPE)
C
111 READ (99,1028) I
81 IF(I)81,81,82
INUNIT=5
GO TO 15
82 INUNIT=8
ASSIGN 83 TO IEOF
IF(I.GT.JFILE)GO TO 84
REWIND 8
JFILE=1
83 IF(I-JFILE)12,12,84
84 JFILE=JFILE+1
85 READ(8,1000,ERR=9992,END=83)
GO TO 85
C
C DECODE DATA BLOCK 13 --- LOW ALTITUDE RADAR MULTIPATH EFFECT
C
113 READ (99,1038) IMUL,IRMP,REFC
IF(IMUL.EQ.0) GO TO 12
CALL PAGES(12,0,JP)
WRITE(6,1098) IRMP,REFC
1098 FORMAT(//, MULTIPATH INPUTS (INITIAL OR CHANGED ',//,

```













```

1012 FORMAT(I2,F7.3,3F7.2,3F6.2,F6.0,2F12.7,2F6.1,2F7.0,F8.2,2F8.3)
1015 FORMAT(5X,I1,I1,I1,I1,9E8.0)
1016 FORMAT(2X,6I1)
1025 2 ALLISTIC 100 TIME/ MIN MAX AZIM ELEV MAX SMOOTH MAX MUZZ
3 X-EL./ T ROUND ELEV VEL MAX VEL TOF1 TOF2 MAX AZ VEL
4 INSTANT 1 CONSTANT 2 MIN MAX MIN RATE RATE MAX CONST ERROR
5 ERROR./)
1026 FORMAT(I5,4X,'0.00',8F8.2)
1028 FORMAT(2X,I4,I2,9E8.0)
1029 FORMAT(1H-,I1,' DENSITY CLASSES FOR PK ACCUMULATION'//9F12.5)
1038 FCRMAT(2X,I3,I5,F10.0)
1041 FORMAT(2X,I3,I3,I2,3F10.0,I5,2F10.0,I5,F10.0)
1042 FORMAT(//,' ECM VARIABLES: )
1043 FORMAT(1AAASIM----,10A10)
1045 1. FIRE TIME RANGE(M) X-SEC(SQM) JAM.GAIN(DB) J/S(DB)',
2. MODE ADC.TRK.VAR. ADD.RNG.VAR. S/N(CB).)
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C00 C00 U U TTTT PPPP U U U TTTT
C0 C0 U U T T P P P
C0 C0 U U T T P P P
C00 C00 U U T T P
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
ENTRY S69 (TEMP,SPKT,SPKT2,*,*,*)
69 DC 92 I=1,4
92 IFLAGS(I)=IFLAGS(I)+IPRINT(I)
C
C PRINT PK AS A FUNCTION OF AIRCRAFT ASPECT AND IMPACT SPEED
C
IF(IPRINT(5).EQ.0)GO TO 80
CALL PRSEGS(SPKT2,ISL)
C
C COMPUTE PK AS A FUNCTION OF ASPECT AND IMPACT SPEED FOR ALL GUNS
80 DO 36 I=1,32
DO 36 J=1,8
PK=RHO(1)*SPKT2(I,J)
36 SPKTOT(I,J)=PK+(1.0-PK)*SPKTOT(I,J)
C
C STORAGE OF PK VS DENSITY FACTOR AND TIME INTERVALS (AT FIRE AND
INTERCEPT) PER WEAPON OR WEAPON COMPLEX
C
CPK=1.0-CPS
DO 55 I=1,NRHOS

```









```

IFLAGS(2)=IFLAGS(2)-IPRINT(2)
IF(IFLAGS(2).GT.0)GO TO 77
IF(IFLAGS(3).LE.0)GO TO 42
76 REWIND 7
CALL PAGES(4,0,JP)
WRITE(6,1035)(I,I=1,10)
41 READ(7) ISL,IGT,IEM,ICB,ISB,IGL,XGUN,YGUN,ZGUN,TREACT,TTRACK,
1 CIRCLE,NROUND,F,CPK,NRHOS,RHO,NTINTS,TINTER,POTTF,POTTF,IPRINT
CALL PAGES(3).LE.0)GO TO 41
CALL PAGES(2,4,JP)
IF(JP.EQ.0)WRITE(6,1035)(I,I=1,10)
WRITE(6,1018)ISL,(POTTF(I),I=1,NTINTS)
DO 410 I=2,NTINTS
410 POTTF(I)=POTTF(I-1)+(1.0-POTTF(I-1))*POTTF(I)
WRITE(6,1058)ISL,(POTTF(I),I=2,NTINTS)
IFLAGS(3)=IFLAGS(3)-IPRINT(3)
IF(IFLAGS(3).GT.0)GO TO 41
IF(IFLAGS(4).LE.0)GO TO 71
42 REWIND 7
CALL PAGES(4,0,JP)
WRITE(6,1036)(I,I=1,10)
43 READ(7) ISL,IGT,IEM,ICB,ISB,IGL,XGUN,YGUN,ZGUN,TREACT,TTRACK,
1 CIRCLE,NROUND,F,CPK,NRHOS,RHO,NTINTS,TINTER,POTTF,POTTF,IPRINT
CALL PAGES(4).LE.0)GO TO 43
CALL PAGES(2,4,JP)
IF(JP.EQ.0)WRITE(6,1036)(I,I=1,10)
WRITE(6,1018)ISL,(POTTF(I),I=1,NTINTS)
DO 430 I=2,NTINTS
430 POTTF(I)=POTTF(I-1)+(1.0-POTTF(I-1))*POTTF(I)
WRITE(6,1058)ISL,(POTTF(I),I=2,NTINTS)
IFLAGS(4)=IFLAGS(4)-IPRINT(4)
IF(IFLAGS(4).GT.0)GO TO 43
IF(IFLAGS(1).LE.0)GO TO 44
71 REWIND 7
CALL PAGES(4,0,JP)
WRITE(6,1017)(I,I=1,9)
74 READ(7) ISL,IGT,IEM,ICB,ISB,IGL,XGUN,YGUN,ZGUN,TREACT,TTRACK,
1 CIRCLE,NROUND,F,CPK,NRHOS,RHO,NTINTS,TINTER,POTTF,POTTF,IPRINT
CALL PAGES(1,4,JP)
IF(JP.EQ.0)WRITE(6,1017)(I,I=1,9)
WRITE(6,1059)ISL,(RHO(I),I=1,NRHCS)
IFLAGS(1)=IFLAGS(1)-IPRINT(1)
IF(IFLAGS(1).GT.0)GO TO 74
CALL PAGES(7+NTINTS,0,JP)
44 WRITE(6,1015)
WRITE(6,1021)(I,I=1,9)
POTTF(1)=PKTFDC(1,1)

```







```

CALL EXIT
ENTRY S9995 (TEMP, SPKT, SPKT2, *, *, *)
WRITE(6,1035)
CALL EXIT
ENTRY S9996 (TEMP, SPKT, SPKT2, *, *, *)
WRITE(6,1037)
CALL EXIT
ENTRY S9997 (TEMP, SPKT, SPKT2, *, *, *)
REWIND 4
LINE = 66
WRITE(6,6060)
FORMAT(///,IX, '***** END OF JOB -- P001 SCENARIO RUN COMPLETE',
1, '*****')
RETURN 3
CALL PAGES(3,0,JP)
WRITE(6,1061)
READ(4,1062,END=991) ICARD,IPRINT,I
CALL PAGES(1,3,JP)
IF (JP.EQ.0) WRITE(6,1061)
WRITE(6,1063) ICARD,IPRINT,I
IF (ISW.NE.100F) CALL AVG(ICARD(3),IPRINT,ISW)
GO TO 990
REWIND 4
CALL EXIT
RETURN 3
WRITE(6,1006)I,ICARD
CALL EXIT
RETURN 3
WRITE(6,1002)
CALL EXIT
RETURN 3
FORMAT(///, 'UNEXPECTED END-OF-RECORD/FILE ENCOUNTERED. ')
FORMAT(///, 'IMPROPER INPUT CARD ENCOUNTERED. ',I2,19A4,A2, ' ')
FORMAT(///, 'GUN TYPE',I2, ' ERROR MODE',I2, ' COMBINATION INVAL
1 IC. ')
FORMAT(///, 'UNRECOVERABLE PARITY ERROR DETECTED. CALL EXIT. ')
FORMAT( ' ECM SHOULD NOT BE SPECIFIED WHEN IEM IS 1 OR 2 ')
FORMAT( ' MULTIPATH TRACKING ERROR SPECIFIED WITH IEM=3 ONLY ')
FORMAT(1H0,4X,DATE,7X,TIME,4X,LCC,GT,EM,CB,SB,GL,5X,P(K,
1,ILL),RDS,XGUN,YGUN,ZGUN,F,TIME,PAGE,/)
FORMAT(2A9,A3,5A2,A10,A5,2A7,3A6)
FORMAT(2(2X,A9),2X,A3,5(2X,A2),2X,A10,1X,A5,2(1X,A7),3(2X,A6))
RETURN 3
RETURN 1
RETURN 2
GC TO IERR,(3,28,9996)
GO TO IEOF,(4,12,40,70,83,9997,9999)
END

```





```

CCCCCCCCCCCC
SUBROUTINE PAGES(N,NT,JP)
  KEEPS NUMBER OF LINES PER PAGE LESS THAN 59, PRINTS HEADER,
  AND GETS TIME INFORMATION FROM SYSTEM. REPLACES
  NPAGE(MAX) AND HEADER IN AFATL PROGRAM.

  N      NUMBER OF LINES TO BE PRINTED BEFORE NEXT CALL TO PAGES.
  NT     NUMBER OF LINES IN TITLE OR HEADER OF DATA BEING PRINTED.
  JP     IF CALL TO PAGES IS TO PRINT HEADER ONLY, "N" SHOULD
        BE NUMBER OF LINES AND "NT" SHOULD BE ZERO.
        FLAG FROM PAGES, SET TO ZERO WHEN A NEW PAGE IS STARTED
        INDICATING NECESSITY TO PRINT HEADER.
  COMMON /BLOCK1/ ITITLE(20)
  COMMON /BLOCK0/ LINE,NUMBER
  JP = 2
  LINE = LINE + N
  IF (LINE .LT. 59) RETURN
  NUMBER = NUMBER + 1
  WRITE (6,1000) ITITLE,NUMBER
  LINE = 2 + N + NT
  JP = 0
  RETURN
1000 FORMAT('LAFATL P-001 AAASIM "',17A4,'" ',A10,2(1XA9),2X'PAGE',I4/)
END
SUBROUTINE PRSEGS(P,ISL)

  PRINTS THE PK AS A FUNCTION OF ASPECT AND IMPACT SPEED TABLES

  THIS SUBROUTINE EXTENSIVELY MODIFIED TO PRINT ASPECT SECTOR
  ANGLES AND PROPERLY LABEL THE TWO CASES FOR WHICH IT
  PRINTS TABLES.
  COMMON /BLOCK3/ XGUN,YGUN,ZGUN
  COMMON /BLOCK4/ IGT,IEM,ICB,ISB,IGL,CIRCLE
  DIMENSION P(32,8),PT(8)
  REAL*8 ANG(8),315-360,'000-045','045-090','090-135','135-180',
1,180-225,'225-270','270-315'
8888 CONTINUE
  PK = 0.0
  PT(1) = 0.0
  PT(2) = 0.0
  PT(3) = 0.0
  PT(4) = 0.0
  PT(5) = 0.0
  PT(6) = 0.0
  PT(7) = 0.0
  PT(8) = 0.0
111 CALL PAGES(6,0,JP)
222 IF (ISL.GT.0) WRITE (6,1001) ISL,IGT,IEM,XGUN,YGUN,ZGUN,CIRCLE

```



```

333 IF (ISL.EQ.0) WRITE (6,1030)
444 WRITE(6,1040)
555 DO 2 I=1,32
666 IAZ = 1 + MCD(I,8)
777 IEL = 2 + (I-1)/8
888 PP=0.0
999 DO 3 J=1,8
112 PT(J)=PT(J)+(1.0-PT(J))*P(I,J)
113 PP=PP+(1.0-PP)*P(I,J)
CALL PAGES(1,6,JP)
IF (JP.NE.0) GO TO 2
IF (ISL.GT.0) WRITE (6,1001) ISL,IGT,IEM,XGUN,YGUN,ZGUN,CIRCLE
IF (ISL.EQ.0) WRITE (6,1030)
WRITE (6,1040)
2 WRITE (6,1041) I,ANG(IAZ),ANG(IEL),(P(I,J),J=1,8),PP
CALL PAGES(2,6,JP)
IF (JP.NE.0) GO TO 4
IF (ISL.GT.0) WRITE (6,1001) ISL,IGT,IEM,XGUN,YGUN,ZGUN,CIRCLE
IF (ISL.EQ.0) WRITE (6,1030)
WRITE (6,1040)
4 WRITE (6,1042) PT,PK
CONTINUE
889 RETURN
1001 FORMAT(' -PK AS A FUNCTION OF ASPECT SECTOR AND IMPACT SPEED.',
1 5X,LOC,14,5X,GT,12,5X,EM,12,5X,X,F7.0,3X,Y,F7.0,3X,Z,
2 F7.0,4X,RADIUS,F5.0,M.)
1030 FORMAT(' -TOTAL PK FOR DENSITY CLASS 1 AS A FUNCTION OF ASPECT',
1 SECTOR AND IMPACT SPEED.',
1040 FORMAT(' -SECTOR AZIMUTH ELEV.,4X,0-152 152-305
1 305-457 457-610 610-762 762-914 914-1067,
2 4X,1067-1219 TOTAL PK, / 9X,REAR=00 DOWN=00')
1041 FORMAT(14,2X,A7,2X,A7,8F12.7,F14.7)
1042 FORMAT(1H0,15X,TOTALS,8F12.7,F14.7)
END
SUBROUTINE TPLOT(NFPA)
PLOTS X VS. Y AND X VS. Z ON PRINTER FOR EACH FLIGHT PATH.
NO PLOT WHEN XMAX-XMIN IS LESS THAN 50.
CC
CC
CC
COMMON XFPA(1201), YFPA(1201), ZFPA(1201),
1 BFPA(1201), AFPA(1201), PFPA(1201),
2 VXFPA(1201), VYFPA(1201), VZFPA(1201)
DIMENSION PLOT(111)
LOGICAL XA
DATA BLANK, YAXIS, XAXIS, POINT/1F, 1F:, 1H-, 1H+/
PLOT ONLY ABOUT 50 POINTS WITH "IFPA".
IFPA = MAX0(NFPA/50,1)
C

```



```

C      MIN-MAX VALUES OF X, Y, AND Z (ZMIN = 0. BY DEFN.)
XMIN = 1.E99
YMIN = 1.E99
XMAX = -1.E99
YMAX = -1.E99
DO 100 I=1,NFPA,IFPA
  XMIN = AMIN1(XMIN,XFPA(I))
  YMIN = AMIN1(YMIN,YFPA(I))
  XMAX = AMAX1(XMAX,XFPA(I))
  YMAX = AMAX1(YMAX,YFPA(I))
ZMAX = AMAX1(ZMAX,ZFPA(I))
100 C CHECK X RANGE TO AVOID FUNNY X-Z PLOT.
    XRNG = XMAX - XMIN
    IF (XRNG.GT. 49.999) GO TO 110
    CALL PAGES(3,0,I)
    WRITE (6,210)
    RETURN
C      SCALE X, Y TC METERS PER CHARACTER.
110 D = AMAX1(XRNG/11.,(YMAX-YMIN)/7.25)
    DX = D/10.
    DY = D/8.
    C CENTER PLOT BY RE-CALCULATING X-Y MIN-MAX.
    XMIN = (XMAX+XMIN)/2. - 55.*DX
    YMIN = (YMAX+YMIN)/2. - 29.*DY
    XMAX = XMIN + 110.*DX
    YMAX = YMIN + 58.*DY
    C SCALE Z (NOT TO SAME SCALE AS X-Y).
    DO 120 I=1,100
      D = FLOAT(I*500)
      IF (D.GT. ZMAX) GO TO 130
      CCNTINUE
120 DZ = D/10.
130 C SEE IF AXES SHOULD APPEAR ON PLOT.
    XA = .FALSE.
    NYA = -10
    IF (XMIN.LE. 0. .AND. XMAX.GE. 0.) XA = .TRUE.
    IF (YMIN.LE. 0. .AND. YMAX.GE. 0.) NYA = .TRUE.
    IF (XA) NXA = 1 + INT(0.5-XMIN/DX)
    IF (NYA) NYA = 1 + INT(0.5-YMIN/DY)
    C SET 8 LINES PER INCH SPACING ON PRINTER.
    WRITE (6,280)
    C SET PAGE CONTROL; PLOT X-Z, THEN X-Y.
    CALL PAGES(56,0,I)
    WRITE (6,250)
    WRITE (6,220)
    IFPA = 2.*IFPA
    DC 160 K=1,11
    DO 140 I=1,111

```





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140  PLOT(I) = BLANK
    IF (K.EQ.11) PLOT(I)=XAXIS
    IF (XA.AND. K.NE.11) PLOT(NXA) = YAXIS
    Z = FLOAT(11-K)*DZ
    DO 150 I=1,NFPA,IFPA
    IF (K.EQ.1+INT(0.5+(XFPA(I)-XMIN)/DX)) PLOT(IX) = POINT
150  WRITE(6,230) PLOT,Z
    WRITE(6,220)
    WRITE(6,250)
    IFPA = IFPA/2
    DO 190 K=1,59
    DC 170 I=1,111
170  PLOT(I) = BLANK
    IF (K.EQ. NYA) PLOT(I) = XAXIS
    IF (XA) PLOT(NXA) = YAXIS
    Y = YMIN + FLOAT(59-K)*DY
    DO 180 I=1,NFPA,IFPA
    IX = 1 + INT(0.5+(XFPA(I)-XMIN)/DX)
180  IF (K.EQ.59-INT((YFPA(I)-YMIN)/DY)) PLOT(IX) = POINT
    I = MOD(K,2)
    IF (I.NE.1) WRITE(6,240) PLOT,Y
190  WRITE(6,220)
    WRITE(6,250)
    PRINT X AXIS VALUES.
    D=10.*DX
    DC 200 I=1,12
200  PLOT(I) = XMIN + D*FLOAT(I-1)
    WRITE(6,270) (PLOT(I),I=1,12),DX,DY
    RE-SET PRINTER SPACING BACK TO 6 LINES PER INCH.
    RETURN
210  FORMAT('ONEARLY CONSTANT X IN FLIGHT PATH. NO PLOT PRINTED. '/')
220  FORMAT(1X,113(1H*))
230  FORMAT(2H*,111A1,1H*,3X'Z'=',F8.1,' M')
240  FORMAT(2H*,111A1,1H*)
250  FORMAT(2X'A',9X'B',9X'C',9X'D',9X'E',9X'F',
1      9X'G',9X'H',9X'I',9X'J',9X'K',9X'L',)
260  FORMAT(2H*,111A1,1H*,3X'Y'=',F8.1,' M')
270  FORMAT(4X'X(A)'=',F8.1,' M',4X'X(B)'=',F8.1,' M',
1      4X'X(D)'=',F8.1,' M',4X'X(E)'=',F8.1,' M',
2      4X'X(G)'=',F8.1,' M',4X'X(H)'=',F8.1,' M',
3      4X'X(J)'=',F8.1,' M',4X'X(K)'=',F8.1,' M',
4      4X'DX'=',F8.1,' M',4X'DY'=',F8.1,' M',
280  FORMAT(1HT)
290  FORMAT(1HS)

```



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C C C
END
SUBROUTINE RPLANE(T)
  COMPUTES INFORMATION ABOUT THE POSITION OF THE AIRCRAFT AT TIME =T

  COMMON/BLOCK2/NFPA,TMIN,TMAX,DTFPA
  COMMON/BLOCK3/XGUN,YGUN,ZGUN
  COMMON/NFPARM/XA,YA,ZA,RA2,RA,TIME
  COMMON/IGXGYG/IG,XG(8),YG(8)
  COMMON XFPA(1201),YFPA(1201),ZFPA(1201),BFPA(1201),AFPA(1201),
1  CCMMON/PFPA(1201),VXFPA(1201),VYFPA(1201),VZFPA(1201),
  * * X,Y,Z,ROL,PIT,FDG,
  * * FGT,FJAM,GJ,SJT,SN
  CALL INTERP((T+TIME)/DTFPA)
  XA=GETVAL(XFPA)-XGUN-ZG(IG)
  YA=GETVAL(YFPA)-YGUN-XG(IG)
  ZA=GETVAL(ZFPA)-ZGUN
  RA2=XA*XA+YA*YA+ZA*ZA
  RA=SQRT(RA2)
  RETURN
  END
  FUNCTION ANGLIM(X)

  LIMITS ANGLES TO PRINCIPAL ANGLES BETWEEN -PI AND +PI

  CCMMON /CONSTS/ DEGREE,RADIAN,PI,PI2,QTRPI,SQRT2
  IF(ABS(X)-PI)1,1,2
1  ANGLIM=X
  RETURN
2  ANGLIM=X-PI2*FLOAT(IFIX((X+SIGN(PI,X))/PI2))
  RETURN
  END
  FUNCTION RSHELL(T)

  COMPUTES RANGE TO SHELL AT TIME = T

  CCMMON/VSASBS/VMUZZ,ASHCON,BSHCON,DQUAD
  DQUAD=1.0+T*(ASHCON+T*BSHCON)
  RSHELL=T*VMUZZ/DQUAD
  RETURN
  END
  FUNCTION VSHELL(T)

  COMPUTES SPEED OF SHELL AT TIME=T. CAN ONLY BE USED AFTER A CALL
  TO RSHELL AT THE SAME TIME, SINCE RSHELL COMPUTES DQUAD FOR VSHELL

  CCMMON/VSASBS/VMUZZ,ASHCON,BSHCON,DQUAD

```



```

VSHLL=VMUZZ*(1.0-BSHCON*T*T)/(DQUAD*DQUAD)
RETURN
END
SUBROUTINE INTERP(FINT)
C
C
C
SETS CONSTANTS (FRACT, INDEX1, AND INDEX2) FOR TWO PCINT INTER-
POLATION
COMMON/MAGIC/FRACT,INDEX1,INDEX2
INDEX1=FINT
FRACT=FINT-FLOAT(INDEX1)
INDEX1=INDEX1+1
INDEX2=INDEX1+1
RETURN
END
FUNCTION GETVAL(ARRAY)
PERFORMS TWO POINT INTERPOLATION
COMMON/MAGIC/FRACT,INDEX1,INDEX2
DIMENSION ARRAY(1201)
GETVAL=ARRAY(INDEX1)+FRACT*(ARRAY(INDEX2)-ARRAY(INDEX1))
RETURN
END
BLOCK DATA
COMMON /BLOCK1/ ITITLE
COMMON /BLOCK3/ XGUN,YGUN,ZGUN
COMMON /BLOCK4/ IGT,IEM,IC8,ISB,IGL,CIRCLE
COMMON /BLOCK5/ NRHOS,RHO(9)
COMMON /BLOCK6/ NTINTS,TINTER(10)
COMMON /BLOCK7/ IVACOM,VAT(9,5,9)
COMMON /BLOCK8/ TREAT,TRACK1,TRACK2
COMMON /BLOCK9/ TROUND(6),THDMAX(6),PHDMAX(6),PHIMIN(6),PHIMAX(6),
VELMIN(6),VELMAX(6),RANMIN(6),RANMAX(6),ATLAG(6),
ETHMAX(6),EPHMAX(6),RMODES(6)
COMMON /BLOCKA/ TFMAX1(6),TFMAX2(6),RVACON(6),RVBCCN(6),VMUZEL(6)
COMMON /CONSTS/ DEGREE,RADIAN,PI,PI2,QTRPI,SQRT2
COMMON /HEADFO/ LINE,NUMBER
COMMON /BUDGET/ BCACON(6)
COMMON /NEWA/ VY1,VY,ALFA,J,IRMP,PLEN,O1,O8,D1,JJJ,XR,ZT,PZI,IERR
COMMON /NEWB/ Y1,P2,VX,BETA,IF6,IMUL,IP,N,O7,C,TTTRACK,KMODE,PSI,K
COMMON /NEWC/ CP,X2,P1,B2,JFILE,IJAM,ISL,C4,CFS,TPERS,JMODE,YT,T2
COMMON /NEWD/ T33,X1,Z2,B1,VX2,C3,CPK,NROUND,IOFF,I,XI,TM,SP,T1
COMMON /NEWE/ Z1,A2,VX1,VZ2,PHI,IF5,IEOF,YR,IF2,T13,IFILE,Y2,A1
COMMON /NEWF/ V2,VZ1,V,FUZZ,IF9,SD2RJ,SD2RJM,V1,VY2,F,J,P,IF7,REFC
COMMON /NEWG/ SJTMAX,O2,PK,D2,ISW
DATA IJAM/O,SD2RJ/O./
DATA IMUL/O/

```

C  
C  
C

C  
C  
C





```

DATA IOFF/2HOF/
DATA IF2,IF5,IF6,IF7,IF9/1,1,1,1,1,1,1/
DATA VX2/0.0/,VY2/0.0/,VZ2/0.0/
DATA X2/0.0/,Y2/0.0/,Z2/0.0/,V2/0.0/,P2/0.0/,A2/0.0/,B2/0.0/
DATA IFILE/9999/,JFILE/9999/
VALUES ON "ASIDOC" CARDS FROM A.S.I. DOCUMENTATION DRAFT. (BEE)
DATA ATLAG /2*9999.99,1.33,9999.99,2*1.33/
DATA BDACON /0.00265/,0.00501,0.0031,0.00697,0.0113,0.0113/
DATA DEGREE /57.295779513082/,RADIAN/0.01745329251994/
DATA EPT HMAX /6*.1/,ETHMAX /6*.1/
DATA IGT /3/,IEM/4/,ICB/1/,ISB/4/,IGL/1/,CIRCLE/0./
INTEG ITRITILE(20)/7*
INTEG IIVACOM(20)/20*
DATA LINE /66/,NUMBER/0/
DATA NRHOS /9/
DATA NTINTS /10/
DATA PHD MAX /43633,78540,34910,31416,3491/
DATA PHIMAX /1.48353,1.57079,1.48353,1.48353,1.51844,1.43117/
DATA PHIMIN /-1.17453,-1.14835,-1.17453,-1.08727,-1.06981,-0.5236/
DATA PI /3.1415926535897/,PI2/6.2831853071796/
DATA QTRPI /0.78539816339745/
DATA RANMAX /3000.3000,3300.5000,5500.99999./
DATA RANMIN /0.0,400.5000,0.30.59999./
DATA RHO /1.5,3333333333,25.2,1666666666,1.02,.01/
DATA RMODES /-1.8,209,251499,22998,089321,07845,050694/
DATA RVACON /0.12392,-0.06259,-0.006889,004262,-0.00421,-0.00357/
DATA SQRT2 /1.414213562371/
TFMAX CARDS PROVIDE EXACT AGREEMENT WITH AFATL PROGRAM ON TEST (BEE)
CASE, BUT NOT EXACT VALUES FOR MAX RANGE. 13 FEB 73
DATA TFMAX1 /1.6,2.2,3.8,4.1,6.2,59.99/
DATA TFMAX2 /99.99,99.99,7.5,99.99,11.6,19.2/
DATA THD MAX /0.5236,5236,1.39626,0.5236,5236,5236/
DATA TINTER /10.,20.,30.,40.,50.,60.,70.,80.,90.,599.99/
DATA TREAT /0./,TRACK1/2.5/,TRACK2/6.0/
DATA TROUND /75.,4.,2.,75.,857.4./
DATA VAT /405*0/
DATA VELMAX /300.,300.,350.,250.,300.,999.9/
DATA VELMIN /0.,0.,0.,0.,0.,999.9/
DATA VMUZEL /840.,1000.,930.,880.,960.0,800./
DATA YGUN /0./
DATA ZGUN /0./
DATA ZGUN /0./
END
SUBROUTINE AVG(ITST,IPRINT,ISW)
DIMENSION IPRINT(6)
DATA IBLNK,SUM,CNT/2H ,0.0,0.0,0/
DATA IALL/2HAL/

```

C

C C



```

CALL REREAD
READ (99,900) PK
900 FORMAT(F10.7)
READ (99,910) YGUN
910 FORMAT(F7.0)
IF(I$W.EQ.IALL) GOTO 600
IF(I$T.EQ.IBLNK) GOTO 200
IF(YGUN.NE.0.0) GOTO 150
CNT=CN+0.5
SUM=SUM+PK/2.
PCLD=0.0
GOTO 500
150 CONTINUE
CNT=CN+1.0
SUM=SUM+PK
PCLD=PK
GOTO 500
200 IF(CNT.LE.0.5) GOTO 500
CNT=CN-0.5
SUM=SUM-PCLD/2.0
201 AVERG=SUM/CNT
WRITE(6,800) CNT,AVERG
800 FORMAT(/5X,18HAVERAGE P(KILL) ON,F6.1,20H OFFSET LOCATIONS IS,
X F10.7/)
SUM=0.0
CNT=0.0
500 RETURN
600 IF(I$T.NE.IBLNK) GOTO 610
IF(CNT.NE.0.0) GOTO 201
GOTO 500
610 SUM=SUM+PK
CNT=CN+1.0
GOTO 500
END
SUBROUTINE JAMER1(PLEN,SDSQ)
SDR = PLEN*0.6826/2.*2.998E8
SDSQ = SDR*SDR
RETURN
END
SUBROUTINE MULPTH(I,REFC,EL,BIAS,SD2)
DIMENSION C(3),S(3),B(3)
DATA
* AK/-0.6931471806/
* ,SQRT2/1.414213562/
* ,B/0.0244346,0.0314159,0.0785398/
* ,C/0.0132557,0.0185345,0.0478558/
* ,S/0.00872665,0.0104720,0.024346/
* BW = B(I)

```



```

CAL = C(I)
SQ = S(I)
DIR = EXP(AK*(SQ/BW)**2)
EL2 = 2.*EL
RL = EXP(AK*((EL2+SQ)/BW)**2)
RL = EXP(AK*((EL2-SQ)/BW)**2)
DRU1S = (DIR+REFC*RU)**2
DRU2S = (DIR-REFC*RU)**2
DRL1S = (DIR+REFC*RL)**2
DRL2S = (DIR-REFC*RL)**2
DIF1 = (DRU1S-DRL1S)
SUM1 = (DRU1S+DRL1S)
DIF2 = (DRU2S-DRL2S)
SUM2 = (DRU2S+DRL2S)
SIGER1 = DIF1/SUM1
SIGER2 = DIF2/SUM2
ANGERR1 = CAL*SIGER1
ANGERR2 = CAL*SIGER2
PPBY2 = ABS(ANGERR2-ANGERR1)/2.
BIAS = ANGERR1+PPBY2
SD = PPBY2/SQRT2
SD2 = SD*SD
RETURN
END
SUBROUTINE ECM1
DIMENSION RGOB(3), PRW(3), FREQ(3), IRTYP(4), RNOISE(3)
DIMENSION TABJ(37,37), TABX(37,37)
COMMON /BLOCK1/ ITITLE(10)
COMMON /HEADFO/ LINE, NUMBER
CCOMMON
*/CECM1/ IREC, IJ, GAINJ, IX, XSEC, CALX, PJW,
X, Y, Z, ROL, PIT, HDG,
FTGT, FJAM, GJ, SJT, SN
NAMELIST/NAME1/RGOB, PRW, FREQ, IRTYP, I, RG, WL, FTGT, FJAM, PJW
DATA
RGDB/40., 38.5, 28./
PRW/10500., 17500., 25000./
FREQ/15.1E9, 9.3805E9, 2.838E9/
IRTP/1, 2, 2, 3/
PI4/12.56637061/
RNOISE/-123.0, -130.6, -132.2/
I = IRTYP(I)
RG = 1J.*(RGDB(I)/10.)
WL = 2.998E8/FREQ(I)
RN = RNOISE(I)
FTGT = PRW(I)*RG*RG*WL*WL/PI4/PI4

```

C

C





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FJAM = PJW*RG*WL*WL/PI4/PI4
CALL PAGES(3,0,JP)
IF(IJ.EQ.0) WRITE(6,9003) GAINJ
9003 FORMAT(/, JAMMER ANTENNA GAIN',F7.3,' DB')
IF(IJ.NE.0) WRITE(6,9004)
9004 FORMAT(/, JAMMER TABLE SPECIFIED')
CALL PAGES(3,0,JP)
IF(IX.EQ.0) WRITE(6,9005) XSEC
9005 FORMAT(/, AIRCRAFT CROSS SECTION ',F9.2,' SQ.METERS')
IF(IX.NE.0) WRITE(6,9006) CALX
9006 FORMAT(/, AIRCRAFT CROSS SECTION TABLE SPECIFIED.',F9.2)
*, PRINTED VALUES WILL BE MULTIPLIED BY CALX. CALX= ',F9.2)
IF(IJ.EQ.0) GO TO 1

C
C
C
JAMMER TABLE

CALL TABLR(TABJ,37)
DO 3 I=1,37
DO 3 J=1,37
TABJ(I,J) = 10.**(TABJ(I,J)/10.)
3 CONTINUE
1 GJ = 10.**(GAINJ/10.)
IF(IX.EQ.0) GO TO 2

C
C
C
X-SECTION TABLE

CALL TABLR(TABX,37)
2 RETURN

C
C
C
ENTRY ECM2

NAMELIST/NAM2/ X,Y,Z,ROL,PIT,HDG,
*,GJ
*,GJ

IF(IX.EQ.0 .AND. IJ.EQ.0) GO TO 5
CALL DIRCOS(X,Y,Z,0.,0.,CX1,CY1,CZ1)
CALL CARROT(CX1,CY1,CZ1,ROL,PIT,HDG,CX2,CY2,CZ2)
CALL RECSPH(CX2,CY2,CZ2,AZ,EL)
IF(IJ.EQ.0) GO TO 6
CALL INTRP(TABJ,AZ,EL,37,GJ)
6 IF(IX.EQ.0) GO TO 5
CALL INTRP(TABX,AZ,EL,37,XSEC)
XSEC = XSEC*CALX
5 D2 = DIST2(X,Y,Z,0.,0.,0.)
SJ = FJAM*GJ/D2

```



```

ST = FTGT*XSEC/D2/D2
SN = 10.*ALOG10(ST)-RN
SJT = 10.*ALOG10(SJ/ST)
RETURN
END
SUBROUTINE JAMER2(IRAD,AJS,SDSQ)
DIMENSION AJS1(3),SD1(3)
DIMENSION AJS2(4),SD2(4)
DIMENSION AJS3(2),SD3(2)
DIMENSION AJS4(4),SD4(4)
DATA
* N1/3/
*,AJS1/ -5., 6., 9./
*,SD1/ 0.002963, 0.01185, 0.1374 /
DATA
* N2/4/
*,AJS2/ -2., 6., 10., 16./
*,SD2/ 0.002963, 0.009877, 0.08278, 0.1374 /
DATA
* N3/2/
*,AJS3/ 15., 30./
*,SD3/ 0.0018, 0.01441 /
DATA
* N4/4/
*,AJS4/ -2., 6., 10., 16./
*,SD4/ 0.006914, 0.02173, 0.1024, 0.1374 /
GC TO (1,2,3,4),IRAD
1 CALL INT2(N1,AJS1,SD1,AJS,SD)
GC TO 5
2 CALL INT2(N2,AJS2,SD2,AJS,SD)
GC TO 5
3 CALL INT2(N3,AJS3,SD3,AJS,SD)
GC TO 5
4 CALL INT2(N4,AJS4,SD4,AJS,SD)
5 SDSQ = SD*SD
RETURN
END
SUBROUTINE INT2(NVAL,X,Y,XVAL,YVAL)
DIMENSION X(NVAL),Y(NVAL)
YVAL = Y(1)
IF(X(1)-XVAL) 4,4,3
4 DC 1 I=1,NVAL
IF(X(I)-XVAL) 1,1,2
1 CONTINUE
YVAL = Y(NVAL)
GO TO 3
2 YVAL = Y(I-1) + (Y(I)-Y(I-1)) / (X(I)-X(I-1)) * (XVAL-X(I-1))
3 RETURN

```



```

END
SUBROUTINE TABLR(TABX, IDIM)

SUBROUTINE TO READ AND PRINT A TABLE CF UP TO 37 X 37 ELEMENTS
THE PROGRAM PROVIDES A DEFAULT VALUE FOR ELEMENTS OUTSIDE THE
DEFINED TABLE.
INPUTS ARE:
CARD VARIABLE FORMAT DEFINITION IDENTIFICATION
1 INAME 8A10 ARBITRARY ELEMENTS
2 NAZ 15 NO. OF AZ ELEMENTS
      NEL 15 (ASSUMING ELEMENT 1 CORRESPONDS TO AZ=0)
      ELEN 15 NO. OF EL ELEMENTS, EL GCES-ELEND TO +ELEND
      AZEND F10.4 MAXIMUM ENTRY EL(DEG)
      DEFALT F10.4 MAXIMUM ENTRY AZ(DEG)
      DEFALT F10.4 DEFAULT VALUE
3+ TABX(IDIM,1) 8F10.0 DATA TABLE

COMMON/TABLES/ELO, DELAZ, DELEL, JEL
DIMENSION TABX(IDIM, IDIM), INAME(8)
DATA LE, LZ/2HEL, 2HAZ/
DATA AZO, CDIR/0., .0174533/
READ(5,98) INAME
READ(5,99) NAZ, NEL, ELEND, AZEND, DEFALT
98 FCRMAT(8A10)
99 FCRMAT(215, 3F10.4)
C NOTE IMPLIED INCREMENT
DELAZ=AZEND/(NAZ-1)
DELEL=(2.*ELEND)/(NEL-1)
C LOCATE FIRST ELEVATION ENTRY ETC
JEL=(IDIM-NEL)/2 +1
MEL=JEL+NEL-1
ELO=-ELEND
WRITE(6,101) INAME, NAZ, AZO, AZEND, DELAZ,
1 LZ, NEL, ELO, ELEND, DELEL, LE, DEFALT
101 FCRMAT(11, 1) TABLE DATA, /, 1X, 8A10, /, 2(1X, 15,
1. ELEMENTS FROM , F10.2, /, TO , F10.2, /, BY ,
2 F10.2, 2X, A2, /), . ELSEWHERE TABLE IS , F10.2)
C INSERT DEFAULT
MAZ=((180./DELAZ)+1
IF ((MAZ.GT.37).OR.(MEL.GT.37)) GO TO 999
DC 8 IAZ=1, MAZ
DC 8 IEL=1, IDIM
8 TABX( IEL, IAZ)=DEFALT
C READ TABLE
DC 14 I=JEL, MEL
READ(5,102) (TABX(I, J), J=1, NAZ)
14 CONTINUE
102 FORMAT(8F10.0)

```





```

ICELAZ=DELAZ
NPAGE=NAZ/13+1
DO 20 LP=1,NPAGE
  JH1=(LP-1)*13+IDELAZ
  JH2=JH1+12*IDELAZ
  KH1=(LP-1)*13+1
  KH2=KH1+12
  IF(LP.EQ.NPAGE)KH2=MAZ
  IF(LP.EQ.NPAGE)JH2=180
  WRITE(6,106)(JH,JH2,IDELAZ),,ELEV',13I9)
106 FORMAT(,1,RCS MATRIX',/,ELEV',13I9)
  JELO=MAXO(JEL-1,1)
  MELO=MINO(MEL+1,1DIM)
  ELPT=ELO-DELEL*(JEL-JELO)
C PRINT TABLE
DO 15 J=JELO,MELO
  WRITE(6,104)ELPT,(TABX(J,K),K=K+1,KH2)
104 FORMAT(1X,F7.1,2X,13F9.2)
  ELPT=ELPT+DELEL
15 CONTINUE
20 CONTINUE
C CONVERT TO RADIANS
DELEL=DELEL*CDTR
DELAZ=DELAZ*CDTR
ELG=ELO*CDTR
RETURN
999 CONTINUE
105 WRITE(6,105)
  FORMAT(, >>> ERROR IN INPUT <<<')
  STOP
END
SUBROUTINE DIRCOS(X1,Y1,Z1,X2,Y2,Z2,COSA,COSB,COSG)
  XC = X2-X1
  YD = Y2-Y1
  ZD = Z2-Z1
  D = SQRT(XD*XD+YD*YD+ZD*ZD)
  COSA = XD/D
  COSB = YD/D
  COSG = ZD/D
  RETURN
END
SUBROUTINE CARROT(X1,Y1,Z1,ROL,PIT,HDG,X2,Y2,Z2)
C CARROT CARTESIAN ROTATION
C HEAD X = X1*COS(HDG) + Y1*SIN(HDG)
      Y = -X1*SIN(HDG) + Y1*COS(HDG)
      Z =
C PITCH
      Z1

```



```

XX = X*COS(PIT)
YY = X*SIN(PIT)
ZZ = X*SIN(PIT)
C ROLL
X2 = XX
Y2 = -YY*SIN(ROL) + YY*COS(ROL)
ZZ = -YY*SIN(ROL) + ZZ*COS(ROL)
RETURN
END
SUBROUTINE RECSPH(X,Y,Z,PHI,THE)
THE = ARCOS(Z/SQRT(X*X+Y*Y+Z*Z))
THE=THE-1.5708
PHI=0.
SB=SQRT(X*X+Y*Y)
IF(SB.NE.0.0)PHI=X/SB
PHI=ARCOS(PHI)
PHI=ABS(PHI)
RETURN
END
SUBROUTINE INTRP(TAB,AZ,EL,NVAL,VALUE)
COMMON/TABLES/ELO,DELAZ,DELEL,JEL
DIMENSION TAB (NVAL,NVAL)
A=ABS(AZ)
E=EL
AAZ=A/DELAZ+1.
IAZ=AAZ
IEL=(E-ELO)/DELEL+JEL
IEL=EEL
IAZ=MIN0(MAX0(IAZ,1),36)
IEL=MIN0(MAX0(IEL,1),36)
V1=TAB(IEL,IAZ)
V2=TAB(IEL,IAZ+1)
V3=TAB(IEL+1,IAZ)
V4=TAB(IEL+1,IAZ+1)
S=AAZ-IAZ
V12=V1+(V2-V1)*S
V34=V3+(V4-V3)*S
S=EEL-IEL
VALUE=V12+(V34-V12)*S
RETURN
END
FUNCTION DIST2(X1,Y1,Z1,X2,Y2,Z2)
XD = X2-X1
YC = Y2-Y1
ZC = Z2-Z1
DIST2 = XD*XD+YD*YD+ZD*ZD
RETURN
END

```



# APPENDIX J

## P001 PROGRAM LISTING (CDC)

```

PROGRAM P7022(INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT,TAPE7,TAPE8,
1 TAPE9,TAPE4,TAPE11)
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
AAASIM -- MULTIPLE GUN ANTI-AIRCRAFT ARTILLERY SIMULATION
WRITTEN BY THOMAS D. MCMURCHIE AND JAMES O. SEVERSON
AIRFORCE ARMAMENT LABORATORY (AFATL-DLYS) EGLIN AFB, FLORIDA
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
PROGRAM RECEIVED 25 OCT 72
CONVERTED AND MAINTAINED BY ASD/XROA
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCMMON/BLOCK1/ITITLE(10)
CCMMON/BLOCK2/NFPA,TMIN,TMAX,DTFPA
CCMMON/BLOCK3/XGUN,YGUN,ZGUN
CCMMON/BLOCK4/IGT,IEM,ICB,ISB,IGL,CIRCLE
CCMMON/BLOCK5/NRHCS,RHO(9)
CCMMON/BLOCK6/NTINTS,TINTER(10)
CCMMON/BLOCK7/IVACOM(8),VAT(9,5,5)
CCMMON/BLOCK8/TREACT,TRACK1,TRACK2
CCMMON/BLOCK9/TREACT(6),THDMAX(6),PHDMAX(6),PHIMIN(6),PHIMAX(6),
1 VELMIN(6),VELMAX(6),RANMIN(6),RANMAX(6),
2 ATLAG(6),ETHMAX(6),EPHMAX(6),RMODES(6)
CCMMON/BLOCK10/TFMAX1(6),TFMAX2(6),RVACON(6),RVBCON(6),VMUZEL(6)
CCMMON/CONSTS/DEGREE,RADIAN,PI,PI2,QTRPI,SQRT2
CCMMON/HEADFO/LINE,NUMBER
CCMMON/NFPARM/XA,YA,ZA,RA2,RA,TIME
CCMMON/IGXGYG/IG,XG(8),YG(8)
CCMMON/MAGIC /FRACT,INDEX1,INDEX2
CCMMON/VASBS/VMUZZ,ASHCON,BSHCON,DQUAD
CCMMON/BUDGET/BDACCN(6)
CCMMON XFPA(1201),YFPA(1201),ZFPA(1201),BFPA(1201),AFPA(1201),
1 PFPA(1201),VXFPA(1201),VZFPA(1201),
* CECM1/IREFCM,IJ,GAINJ,IX,XSEC,CALX,PJH,
* X,Y,Z,ROL,PIT,HDG,
  FTGT,FJAN,GJ,SJT,SN
C
DIMENSION ICARD(8),TEMP(16,6),PTOTTF(10),PTCTTI(10)
DIMENSION PKTIDC(9),PKTIDC(10,9),PKTFDC(10,5)
DIMENSION SPKT(8,4,8),SPKT2(32,8),SPKTOT(32,8),IPRINT(6),IFLAGS(4)
EQUIVALENCE (SPKT2(1,1),SPKT(1,1,1),TEMP(1,1,1))
C
SOME EQUIVALENCES REMOVED BY B.E.E. BY CARRYING TWO VARIABLES
THROUGH PROGRAM WITH SAME VALUES FOR CLARITY.
C

```





C

```
DATA JFILE/9999/,JFILE/9999/,INUNIT/5/,FUZZ/0.0000000001/
DATA ESVPCT/0.10/
DATA X2/0.0/,Y2/0.0/,Z2/0.0/,V2/0.0/,P2/0.0/,A2/0.0/,B2/0.0/
DATA VX2/0.0/,VY2/0.0/,VZ2/0.0/
DATA IF2,IF5,IF6,IF7,IF9,IFLAGS/1,1,1,1,1,0,0,0,0/
DATA IOFF/2-HOF/
DATA IMUL/0/
DATA IJAM/0/,SD2RJ/0./,SD2J/0./
DATA ILOOP/-1/
CALL FTN8IN(1,0,CPU)
CALL SECOND(CPU)
CALL TIMREM(CIO)
CALL DATE(1,TITLE(9))
ASSIGN 9996 TO IERR
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C I I I I N N I I I I T T T T I I I I A A L I I I I Z Z Z Z E E E E
C I I I I N N N I I I I T T T T I I I I A A L I I I I Z Z Z Z E E E E
C I I I I N N N N I I I I T T T T I I I I A A L I I I I Z Z Z Z E E E E
C I I I I N N N N I I I I T T T T I I I I A A A A L I I I I Z Z Z Z E E E E
C I I I I N N N N I I I I T T T T I I I I A A L L L L I I I I Z Z Z Z E E E E
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
READ(INUNIT,1050) ISW,AMASK
AMASK1=AMASK*57.3
PRINT 38,AMASK1
FORMAT(5X,25HMASK ANGLE FOR THIS RUN =,F6.3,5H DEG.)
1050 38 95
95 ISL=1
IMUL = 0
IJAM = 0
SD2RJ = 0.
SD2J = 0.
DC 96 J=i,9
PKTTDC(J)=0.0
DC 96 I=1,10
PKTIDC(I,J)=0.0
96 PKTFDC(I,J)=0.0
DC 94 I=1,32
DC 94 J=1,8
94 SPKIDT(I,J)=0.0
REWIND 7
ASSIGN 9997 TO IEOF
GO TO 15
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C I I I I N N P P P P U U T T T T
C
```







```

IF (EOF(9).NE.0.) GO TO IEOF,(4,12,40,70,83,5557,9999)
IF (IOCHEC(9).NE.0.) GO TO IERR,(3,28,9996)
GO TO 3
4 IF (JMODE.GT.1) GO TO 2
  ASSIGN 9999 TO IEOF
  ASSIGN 28 TO IERR
  READ (9)
IF (EOF(9).NE.0.) GO TO IEOF,(4,12,40,70,83,9997,9999)
IF (IOCHEC(9).NE.0.) GO TO IERR,(3,28,9996)
28 ASSIGN 9996 TO IERR
  JMODE=6
5 T1=T2
  X1=X2
  Y1=Y2
  Z1=Z2
  P1=P2
  A1=A2
  B1=B2
  V1=V2
  VX1=VX2
  VY1=VY2
  VZ1=VZ2
  IF (JMODE) 6,6,7
6 READ (INUNIT,1000) T2,X,Y,Z,VX,VY,VZ2,B2,A2,P2
  IF (EOF(INUNIT).NE.0.) GO TO IEOF,(4,12,40,70,83,9997,9999)
  IF (IOCHEC(INUNIT).NE.0.) GO TO IERR,(3,28,9996)
  B2=B2*RADIAN
  A2=A2*RADIAN
  P2=P2*RADIAN
  V2=SQRT(VX*VX+VY*VY+VZ2*VZ2)
  GO TO 9
7 JMODE=JMODE+1
  IF (JMODE.LE.6) GO TO 8
  JMODE=1
  READ(9) TEMP
IF (EOF(9).NE.0.) GO TO IEOF,(4,12,40,70,83,9997,9999)
IF (IOCHEC(9).NE.0.) GO TO IERR,(3,28,9996)
8 T2 =TEMP( 1,JMODE)
  X =TEMP( 2,JMODE)
  Y =TEMP( 3,JMODE)
  Z =TEMP( 4,JMODE)
  VX =TEMP( 5,JMODE)
  VY =TEMP( 6,JMODE)
  VZ2=TEMP( 7,JMODE)
  V2 =TEMP(11,JMODE)
  B2 =TEMP(13,JMODE)
  A2 =TEMP(14,JMODE)
  P2 =TEMP(15,JMODE)

```





```

9  X2=XT+(X-XR)*CP+(Y-YR)*SP
   Y2=YT+(Y-YR)*CP-(X-XR)*SP
   Z2=ZT+Z
   VX2=VX*CP+VY*SP
   VY2=VY*CP-VX*SP
   B2=ANGLIM(B2-PZI)
   T2=T2-TMIN
10  IF(TM-GT.T2)GO TO 5
   F=(TM-T1)/(T2-T1)
   NFPA=NFPA+1
   XFPA(NFPA)=X1+F*(X2-X1)
   YFPA(NFPA)=Y1+F*(Y2-Y1)
   ZFPA(NFPA)=Z1+F*(Z2-Z1)
   VXFPA(NFPA)=VX1+F*(VX2-VX1)
   VYFPA(NFPA)=VY1+F*(VY2-VY1)
   VZFPA(NFPA)=VZ1+F*(VZ2-VZ1)
   V=V1+F*(V2-V1)
   BFPA(NFPA)=ANGLIM(B1+F*ANGLIM(B2-B1))
   AFPA(NFPA)=A1+F*(A2-A1)
   PFPA(NFPA)=ANGLIM(P1+F*ANGLIM(P2-P1))
   K=K-1
   IF(K)34,34,35
34  K=KMODE
   PHI=DEGREE*PFPA(NFPA)
   BETA=DEGREE*BFPA(NFPA)
   ALFA=DEGREE*AFPA(NFPA)
   CALL PAGES(1,2,JP)
   IF(JP.EQ.0)WRITE(6,1003)
   WRITE(6,1004)TM,XFPA(NFPA),YFPA(NFPA),ZFPA(NFPA),BETA,ALFA,PHI
1  TM=DTFPA*FLCAT(NFPA)
   IF(TM.LE.TMAX)GO TO 10
   TMAX=TM-DTTPA-FUZZ
   CALL PAGES(4,3,JP)
   WRITE(6,1005)XR,YR,XT,YT,PSI,ZT
   CALL TPLOT(NFPA)
   IF(JMODE.GT.0.OR.INUNIT.EQ.8)GO TO 12
   ASSIGN 12 TO IEOP
   READ(INUNIT,1000)
13  IF(EOF(INUNIT).NE.0.)GO TO IEOP,(4,12,40,70,83,9997,9999)
   IF(JOCHEC(INUNIT).NE.0.)GO TO IERR,(3,28,9996)
   GO TO 13
C  DECODE DATA BLOCK 03 -- WEAPON LOCATION
C
C  103 DECODE(30,1008,ICARD)XGUN,YGUN,ZGUN
C  GO TO 12
C

```



```

C      LECODE DATA BLOCK 04 -- WEAPON TYPE, MODE, NUMBER OF BARRELS (CYCLIC
C      AND SIMULTANEOUS), NUMBER OF WEAPONS PER
C      LOCATION, RADIUS OF CIRCLE OF WEAPON COMPLEX
C
104  DECODE(14,1009,ICARD)IGT,IEM,ICB,ISB,IGL,CIRCLE
      IF(IGL-1)9958,61,66
61  XG(1)=0.0
      YG(1)=0.0
      GO TO 12
66  DO 16 I=1,IGL
      F=PI2*FLOAT(I)/FLOAT(IGL)
      XG(I)=CIRCLE*COS(F)
16  YG(I)=CIRCLE*SIN(F)
      GO TO 12

C      DECODE DATA BLOCK 05 -- WEAPON DENSITY FACTORS
C
105  DECODE(78,1015,ICARD)IF5,NRHOS,(RPO(I),I=1,NRHOS)
      GO TO 12

C      DECODE DATA BLOCK 06 -- PK ACCRUAL TIME INTERVALS
C
106  DECODE(78,1015,ICARD)IF6,NTINTS,(TINTER(I),I=1,NTINTS)
      NTINTS=NTINTS+1
      TINTER(NTINTS)=999.99
      GO TO 12

C      DECODE DATA BLOCK 07 -- AIRCRAFT VULNERABLE AREAS
C
107  DC 11 I=1,8
      11  IVACOM(I)=ICARD(I)
      READ(INUNIT,1000)(VAT(1,1,K),K=2,9)
      IF (EOF(INUNIT).NE.0.) GO TO IEOF,(4,12,40,70,83,9997,9999)
      IF (IOCHEC(INUNIT).NE.0.) GO TO IERR,(3,28,9996)
      DC 88 J=2,4
      DO 89 I=1,8
      READ (INUNIT,1000) (VAT(I,J,K),K=2,9)
      IF (EOF(INUNIT).NE.0.) GO TO IEOF,(4,12,40,70,83,9997,9999)
      IF (IOCHEC(INUNIT).NE.0.) GO TO IERR,(3,28,9996)
89  CONTINUE
      DC 88 K=2,9
88  VAT(9,J,K)=VAT(1,J,K)
      READ(INUNIT,1000)(VAT(1,5,K),K=2,9)
      IF (EOF(INUNIT).NE.0.) GO TO IEOF,(4,12,40,70,83,9997,9999)
      IF (IOCHEC(INUNIT).NE.0.) GO TO IERR,(3,28,9996)
      DC 18 K=2,9
      DO 18 I=2,9
      VAT(I,5,K)=VAT(1,5,K)

```



```

18 VAT(I,1,K)=VAT(1,1,K)
   IF7=1
   GO TO 12
C
C   DECODE DATA BLOCK 08 -- WEAPON REACTION AND TRACK TIMES
C
108 DECODE(30,1008,ICARD)TREAT,TRACK1,TRACK2
   GO TO 12
C
C   DECODE DATA BLOCK 09 -- WEAPON PARAMETERS
C
109 DECODE(78,1008,ICARD)TROUND(IGT),THDMAX(IGT),PHDMAX(IGT),
1   PHIMIN(IGT),PHIMAX(IGT),VELMIN(IGT),VELMAX(IGT),
2   RANMIN(IGT),RANMAX(IGT)
   READ(INUNIT,1000)ATLAG(IGT),ETHMAX(IGT),EPHMAX(IGT),RMODES(IGT)
   IF (EOF(INUNIT).NE.0.) GO TO IEOF,(4,12,40,70,83,9997,9999)
   IF (IOCHEC(INUNIT).NE.0.) GO TO IERR,(3,28,5956)
   IF9=1
   GO TO 12
C
C   DECODE DATA BLOCK 10 -- SHELL PARAMETERS
C
110 DECODE(46,1008,ICARD)TFMAX1(IGT),TFMAX2(IGT),RVACON(IGT),
1   RVBCON(IGT),VMUZEL(IGT)
   IF9=1
   GO TO 12
C
C   DECODE DATA BLOCK 11 -- INPUT OPTION (CARD/TAPE)
C
111 DECODE(4,1028,ICARD)I
81 IF(I)81,81,82
   INUNIT=5
82 GO TO 15
   INUNIT=8
   ASSIGN 83 TC IEOF
   IF(I.GT.JFILE)GO TO 84
   REWIND 8
   JFILE=1
83 IF(I-JFILE)12,12,84
84 JFILE=JFILE+1
85 READ(8,1000)
   IF (EOF(8).NE.0.) GO TO 83
   IF (IOCHEC(8).NE.0.) GO TO IERR,(3,28,9996)
   GO TO 85
C
C   DECODE DATA BLOCK 13 ---- LOW ALTITUDE RADAR MULTIPATH EFFECT
C
113 DECODE(18,1038,ICARD) IMUL,IRMP,REFC

```





```

C
C
C
IF(IMUL.EQ.0) GO TO 12
CALL PAGES(12,0,JP)
WRITE(6,1098) IRMP,REFC
1098 O* IRMP = * MULTIPATH INPUTS (INITIAL OR CHANGED *,//,
      I* REFC = *,I5,/,
      GO TO 12
      *,F6.3,///)
      C
      DECODE DATA BLOCK 14 --- ECM
      C
      114 SD2RJ = 0.
      SC2RJ = 0.
      DECODE(78,1041,ICARD) IJAM,IP,IJ,GAINJ,PJW,PLEN,IX,XSEC,CALX,
        * IREC,SJTMAX
        C
        IF(IJAM.EQ.0) GO TO 12
        CALL PAGES(28,0,JP)
        WRITE(6,1096) IP,IJ,GAINJ,PJW,PLEN,IX,XSEC,CALX,IRECM,SJTMAX
1096 FFORMAT(///,* ECM INPUTS (INITIAL CR CHANGED) *,//,
      O* IP = *,I5,/,
      1* IJ = *,I5,/,
      2* GAINJ(DB) = *,F7.2,/,
      3* PJW(W) = *,F9.2,/,
      4** PLEN(S) = *,E12.6,/,
      5** IX = *,I5,/,
      6** XSEC(SQM) = *,F10.3,/,
      7** CALX = *,F10.3,/,
      8** IREC = *,I5,/,
      9* SJTMAX(DB) = *,F7.2,///)
      CALL ECM1
      IF(IRECM.EQ.3) CALL JAMER1(PLEN,SC2RJM)
      IF(IEM.EQ.4) CALL JAMER1(PLEN,SD2RJM)
      GO TO 12
      C
      DECODE DATA BLOCK 12 -- PRINT OPTIONS FOR OUTPUT FORMAT - ALSO
      SIGNALS FOR RUN TO BEGIN
      C
      112 DECODE(6,1016,ICARD)IPRINT
      C
      PRINT DATA BLOCKS 6, 7, 9, AND 10 (IF THEY CHANGE)
      "IF2" IS USED TO SET LINE COUNT TC PROPER VALUE. INPUT AND
      OUTPUT PRINT CUT START A NEW PAGE FOR EACH "12" CARD.
      C
      IF (IF2.EQ.0) LINE = 66
      IF2=0
      IF(IJAM.EQ.0) GO TO 48
      IF(IP.EQ.0) GO TO 48
      WRITE(11,1043) ITITLE
      WRITE(11,1042)

```



```

WRITE(11,1001) ISL,IGT,IEM,XGUN,YGUN,ZGUN,CIRCLE
WRITE(11,1045)
CCCONTINUE
48 IF(IF5.EQ.0)GO TO 97
CALL PAGES(5,0,JP)
WRITE(6,1029)NRHOS,(RHO(I),I=1,NR+CS)
IF5=0
97 IF(IF6.EQ.0)GO TO 98
CALL PAGES(5,0,JP)
WRITE(6,1011)NTINTS,(TINTER(I),I=1,NTINTS)
IF6=0
98 IF(IF7.EQ.0)GO TO 99
CALL PAGES(7,0,JP)
WRITE(6,1010)IVACCM
DO 19 N=1,26
J=(N+14)/8
I=15+N-J*8
CALL PAGES(1,7,JP)
IF(JP.EQ.0) WRITE(6,1010) IVACCM
19 WRITE(6,1026)N,(VAT(I,J,K),K=2,9)
IF7=0
99 IF(IF9.EQ.0)GO TO 87
CALL PAGES(10,0,JP)
WRITE(6,1025)
DO 86 I=1,6
O1=PHIMIN(I)*DEGREE
O2=PHIMAX(I)*DEGREE
O3=THDMAX(I)*DEGREE
O4=PHDMAX(I)*DEGREE
O7=ETHMAX(I)*DEGREE
O8=EPHMAX(I)*DEGREE
86 WRITE(6,1012)I,TROUND(I),O1,O2,O3,C4,TFMAX1(I),TFMAX2(I),VMUZEL(I)
1,RVACON(I),RVBCON(I),VELMIN(I),VELMAX(I),RANMIN(I),RANMAX(I)
2,ATLAG(I),O7,O8
IF9=0
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C      SSSS      EEEEE      TTTT      U      U      U      PPPP
C      S      E      T      U      U      U      P
C      SSS      EEEE      T      U      U      U      PPPP
C      SSSS      EEEEE      T      UUU      P
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C      NROUND=0
87 IF(IMUL.EQ.1 .AND. IEM.NE.3) GO TO 9994
IF(IJAM.EQ.1 .AND. (IEM.EQ.1 .OR. IEM.EQ.2)) GO TO 9995
CPS=1.0

```









```

C
C
C      COMPUTE ACTUAL AIRCRAFT PARAMETERS AT FIRE TIME FOR USE IN ERROR EQS
60 CALL INTERP(TIME/DTFPA)
   X=GETVAL(XFPA)-XGUN
   Y=GETVAL(YFPA)-YGUN
   Z=GETVAL(ZFPA)-ZGUN
   VX=GETVAL(VXFPA)
   VY=GETVAL(VYFPA)
   VZ=GETVAL(VZFPA)
   ILOOP = ILOOP+1
   ROL = GETVAL(PFPA)
   PIT = GETVAL(AFPA)
   HCG = GETVAL(BFPA)
   G2=X*X+Y*Y
   G=SQRT(G2)
   THET=ATAN2(Y,X)
   PHIT=ATAN2(Z,G)

C
C
C      IF MULTIPATH HAS BEEN SPECIFIED(IMUL=1) AND THE ELEVATION
C      ANGLE IS MEASURED BY RADAR(IOEM=3), COMPUTE THE ELEVATION
C      TRACKING BIAS(PBMP), VARIANCE(SP2MP), AND APPARENT TARGET
C      ALTITUDE(Z).
   SP2MP = 0.
   PBMP = 0.
   IF(IMUL.NE.1.OR.IOEM.NE.3) GO TO 30
   CALL MULTPTH(IRMP,REFC,PHIT,PBMP,SP2MP)
   PHIT = PHIT+PBMP
   Z = G*TAN(PHIT)
30 CONTINUE
   R = SQRT(G2+Z*Z)
   RD=(X*VX+Y*VY+Z*VZ)/R
   TD=(X*VY-Y*VX)/G2
   PD=(VZ-Z*RD/R)/G
   IF(TIME.GT.TMIN) GO TO 58
   RCD=TD=PDD=0.0
   RANS=R
   THES=THET
   PHIS=PHIT
   ERAN2=ERAN3=ERAN4=ETHE2=ETHE3=ETHE4=EPHI2=EPHI3=EPHI4=0.0
   GO TO 59
58 RDD=(RD-RDS)/.064
   TDD=(TD-TDS)/.064
   PDC=(PD-PDS)/.064

C
C
C      (STORE PREVIOUSLY OBSERVED MEAN TRACKING ERRORS FOR USE IN MEAN
C      TRACKING ERROR EQUATIONS)

```



```

C      59  ERAN1=ERAN2
          ERAN2=ERAN3
          ERAN3=ERAN4
          ERAN4=R-RANS
          ERAN=ERAN1+.71875*(ERAN2-ERAN1)
          ETHE1=ETHE2
          ETHE2=ETHE3
          ETHE3=ETHE4
          ETHE4=(G/R)*ANGLIM(THET-THES)
          ETHE=ETHE1+.71875*(ETHE2-ETHE1)
          EPHI1=EPHI2
          EPHI2=EPHI3
          EPHI3=EPHI4
          EPHI4=PHIT-PHIS
          EPHI=EPHI1+.71875*(EPHI2-EPHI1)
          CHECK MASK ANGLE
          IF(PHIT.LE.AMASK) TFIRE= TIME+ TREAT+TTRACK
          (SKIP FIRE ATTEMPT IF INSUFFICIENT TRACKING TO FIRE)
          IF(TIME.LE.TFIRE)GO TO 62
          CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
          C      FFFF IIIII RRRR EEEEE
          C      FFFF I R RRRR E
          C      FFFF I RRRR EEEEE
          C      F I R R R E
          C      F IIIII R R EEEEE
          CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
          C      VG=SQRT(VX*VX+VY*VY)
          C      V=SQRT(VG*VG+VZ*VZ)
          C      PSI=ANGLIM(PFPA(INDEX1)+FRACT*ANGLIM(PFPA(INDEX2)-PFPA(INDEX1)))
          C      (SKIP FIRE ATTEMPT IF MAX ALLOWED TRACKING ERROR IS EXCEEDED)
          C
          C      54  IF(ABS(ETHE4).GT.ETMAX)GO TO 64
          C      IF(ABS(EPHI4).GT.EPMAX)GO TO 64
          C      IF(IOEM.GT.1)GO TC 56
          C      (LIMIT INPUT RANGE ESTIMATE)
          C      RC=AMAX1(RMIN,AMIN1(RMAX,RANS-0.575*RD))
          C      COMPUTE MEAN ASSUMED TIME OF FIRE AIRCRAFT POSITION (MECHANICAL
          C      COMPUTATION)

```



```

XC
XC
XC
XF=RC*CTBCPB-XG(IG)
YF=RC*STBCPB-YG(IG)
ZF=RC*SPB
GF=SQRT(XF*XF+YF*YF)
RF=SQRT(GF*GF+ZF*ZF)

(SET UP MATRIX T, THE TRANSFORMATION BETWEEN THE LINE OF SIGHT
SYSTEM AND THE FALSE HORIZON SYSTEM)

T22=CT=X/G
ST=Y/G
T33=CP=G/R
T13=SP=Z/R
CS=COS(PSI)
SS=SIN(PSI)
CA=VG/V
SA=VZ/V
CG=VX/VG
SG=VY/VG
T11=CT*CP
T12=ST*CP
T21=-ST
T31=-CT*SP
T32=-ST*SP

(SET UP FALSE HORIZON SYSTEM VELOCITY COMPONENTS)

C
C
C
VXP=T11*VX+T12*VY+T13*VZ
VYP=T21*VX+T22*VY
VZP=T31*VX+T32*VY+T33*VZ
VGP=SQRT(VXP*VXP+VYP*VYP)
CAP=VGP/V
SAP=VZP/V
CBP=VXP/VGP
SBP=VYP/VGP

(SET UP UNIT VECTOR OUT LEFT WING OF AIRCRAFT)

C
C
C
UX=-SA*CG*SS-SG*CS
UY=CG*CS-SA*SG*SS
UZ=CA*SS
UZP=T31*UX+T32*UY+T33*UZ
IF(VXP) 31,32,31
CSP=-T11*UX-T12*UY-T13*UZ
GC TO 33
32 CSP=(VGP*(T21*UX+T22*UY)+UZP*VZ*SBP)/VXP
31
33 SSP=UZP/CAP
C

```





```

C      ( COMPUTE FALSE HORIZON SYSTEM MEAN AND STANDARD DEVIATION CF
C      ERROR IN DIVE AND COURSE ANGLE ESTIMATES)
      EMAP=SAP*(.3196*ABS(CBP)-.1859*ABS(SBP))
      ESAP=.04712+.08063*ABS(SAP)*(1.0+1.16*ABS(CBP))
      EMBP=.4060*CAP*SBP*CBP
      ESBP=(.1670-.08098*ABS((CBP*CBP-SBP*SBP)*CSP))+
      .09006*ABS(SBP*SSP*CSP))/CAP
1      SEMAP=$IN(EMAP)
      CEMAP=$COS(EMAP)
      SEMBP=$IN(EMBP)
      CEMBP=$COS(EMBP)
      THE NEXT CARD ELIMINATES AN EQUIVALENCE BY USING A DOUBLE
      REPLACEMENT.
      A33=SABP=SAP*CEMAP+CAP*SEMAP
      CABP=CAP*CEMAP-SAP*SEMAP
      SBBP=SBP*CEMBP+CBP*SEMBP
      CBBP=CBP*CEMBP-SBP*SEMB
      ( LIMIT VELOCITY ASSESSMENT (MECHANICAL COMPUTERS))
      VBP=AMIN1(VMAX,AMAX1(VMIN,V))
      ESVP=ESVPCT*V
      SET UP THE ELEMENTS CF THE MATRIX A.
      A CONTAINS THE PARTIALS OF VXE,VYE,VZE W.R.T. ALPHA,EETA,SPEED
      A31=CABP*CBBP
      A32=CABP*SBBP
      A21=-VBP*A32
      A22=VBP*A31
      A11=-VBP*SABP*CBBP
      A12=-VBP*SABP*SBBP
      A13=VBP*CABP
      CCMPUTE MEAN ESTIMATED VELOCITY COMPONENTS (MECHANICAL
      COMPUTATION)
      VXE=(A31*T11+A32*T21+A33*T31)*VBP
      VYE=(A31*T12+A32*T22+A33*T32)*VBP
      VZE=(A31*T13
      +A33*T33)*VBP
      GO TO 63
      CCMPUTE MEAN ASSUMED TIME OF FIRE AIRCRAFT POSITION (ELECTRONIC
      COMPUTATION)
56      XF=RANS*CTBCPB
      YF=RANS*STBCPB

```



ZF=RANS\*SPB  
GF=RANS\*CPB  
RF=RANS

ITERATION TO DETERMINE MEAN THEORETICAL INTERCEPT POINT

```

63 RS=0.0
   VS=VMUZZ
   T=0.0
21 XE=XF+VXE*T
   YE=YF+VYE*T
   ZE=ZF+VZE*T
   XE2=XE*XE
   YE2=YE*YE
   ZE2=ZE*ZE
   GE2=XE2+YE2
   RE2=GE2+ZE2
   RE=SQRT(RE2)
   RC=RE-RS
   IF(RC.LT.1.0)GO TO 22
   VD=VS-(XE*VXE+YE*VYE+ZE*VZE)/RE
   IF(VD.LE.1.0)GO TO 64
   T=T+RC/VD
   IF(T.GT.TTFMAX)GO TO 64
   RS=RSHELL(T)
   VS = VSHELL(T)
   GC TO 21
22 T2=T*T

```

CHANGE 22 JAN 76  
IF INTERCEPT POINT BELOW MASK\*\*\*\*\*SKIP FIRE

GE= SQRT(GE2)  
IF(ATAN2(ZE,GE).LE. AMASK) GO TO 64

ITERATION TO DETERMINE ACTUAL INTERCEPT POSITION, RANGE, AND TIME

```

23 TU=AMIN1(TFMAX,TMAX-TIME)
   CALL RPLANE(TU)
   IF(RSHELL(TU).GT.RA)GO TO 24

```

(SKIP FIRE ATTEMPT IF SHELL CANNOT CATCH AIRCRAFT)

```

1 IF((XA*GETVAL(VXFFPA)+YA*GETVAL(VYFPA)+ZA*GETVAL(VZFFPA))/RA .LT.
   VSHELL(TU))GO TO 64
   TU=TU-1.0
   IF(TU)64,64,23
24 TL=0.0

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25 T=0.5*(TL+TU)
   CALL RPLANE(T)
   RC=RA-RSHELL(T)
   IF(RC.GT.1.0)GO TO 26
   IF(RC.GT.-1.0)GO TO 37
   TU=T
   GC TO 25
26 TL=T
   GC TO 25
37 Q0=VS*RE-XE*VXE-YE*VYE-ZE*VZE
   Q1=(VZE-VS*ZE/RE)/Q0
   Q2=(XE*VXE-YE*VYE)/Q0
   COMPUTE THE PARTIAL DERIVATIVES OF BIG THETA
   DTTDX=Q2*XE-YE
   DTTDY=Q2*YE+XE
   DTTDZ=Q2*ZE
   DTTDR=(ZF*DTTDZ+ YF*DTTDY+XF*DTTDX)/RF
   DTTDT= XF*DTTDY-YF*DTTDX
   DTTDP= GF*DTTDZ-(YF*DTTDY+XF*DTTDX)*ZF/GF
   COMPUTE THE PARTIAL DERIVATIVES OF BIG PHI
   DPPDX=Q1*XE
   DPPDY=Q1*YE
   DPPDZ=Q1*ZE+1.0
   DPPDR=(ZF*DPPDZ+ YF*DPPDY+XF*DPPDX)/RF
   DPPDT= XF*DPPDY-YF*DPPDX
   DPPDP= GF*DPPDZ-(YF*DPPDY+XF*DPPDX)*ZF/GF
   GE4=GE2*GE2
   GC TO (210,220,230,240),IOEM
   COMPUTATIONS FCR MODE 1 OPERATION
210 GO TO (211,212,213,214,215,999),IGT
   TRACKING ERROR DISTRIBUTION SIZES (SPHERICAL COORDINATES)
   (FOR GT 1, 2, OR 3)
211 CCNTINUE
212 CCNTINUE
213 SR2=(123.0+0.0225*R)**2
   ST2=(.0643*TD)**2
   SP2=(.1320*PD)**2
   GC TO 219
   (FOR GT 4 AND 5)

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C 214 CONTINUE
215 SR2=(123.0+0.0225*R)**2
    SP2=(0.0167-.000710/(.0517+ABS(TD)))**2
    SP2=(0.0116-.000216/(.0235+ABS(PD)-4.0*PDD))**2
C
C  SET UP THE ELEMENTS OF THE MATRIX E=AT
C
219 B11=A11*T11+A12*T21+A13*T31
    B12=A11*T12+A12*T22+A13*T32
    B13=A11*T13+A12*T23+A13*T33
    B21=A21*T11+A22*T21
    B22=A21*T12+A22*T22
    B23=A21*T13+A22*T23
    B31=A31*T11+A32*T21+A33*T31
    B32=A31*T12+A32*T22+A33*T32
    B33=A31*T13+A32*T23+A33*T33
C
C  COMPUTE THE PARTIAL DERIVATIVES OF BIG THETA AND BIG PHI W.R.T.
C  ON CARRIAGE INPUTS (ALPHA, BETA, SPEED)
C
    DTTDAP=B11*DTTDX+B12*DTTDY+B13*DTTDZ
    DTTDBP=B21*DTTDX+B22*DTTDY+B23*DTTDZ
    DTTDVP=B31*DTTDX+B32*DTTDY+B33*DTTDZ
    DPPDAP=B11*DPPDX+B12*DPPDY+B13*DPPDZ
    DPPDBP=B21*DPPDX+B22*DPPDY+B23*DPPDZ
    DPPDVP=B31*DPPDX+B32*DPPDY+B33*DPPDZ
C
C  COMPUTE THE VARIANCES OF BIG THETA AND BIG PHI
C
    STT2=((DTTDR**2)*SR2+(DTTDT**2)*ST2+(DTTDP**2)*SP2
1      +((DTTDAP*ESAP)**2+(DTTDBP*ESBP)**2+(DTTDP*ESVP)**2)*T2)/GE4
    SPP2=((DPPDR**2)*SR2+(DPPDT**2)*ST2+(DPPDP**2)*SP2
1      +((DPPDAP*ESAP)**2+(DPPDBP*ESBP)**2+(DPPDP*ESVP)**2)*T2)/GE2
    GO TO 29
C
C  COMPUTATIONS FOR MODE 2, 3, OR 4 OPERATION
220 GO TO (999,999,223,999,225,226),IGT
C
C  TRACKING ERROR DISTRIBUTIONS SIZES (SPHERICAL COORDINATES)
C  (FOR MODE 2)
C
223 CONTINUE
225 CCNTINUE
226 SR2=(41.0+0.0075*R)**2
    ST2=(.000982+.1681*TD*TD)**2
    SP2=(.000491+.033*ABS(PD)-4.0*PDD)**2

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230 GO TO 65
231 GO TO (999,999,233,999,235,236),IGT
232 (FOR MODE 3)
233 CCNTINUE
234 CCNTINUE
235 SR2=(17.0+0.24*ABS(RDD)+0.018*RDD*RDD)**2+SD2RJ
236 SP2=(0.00196+0.050*TD)**2
SP2=(0.000982+0.11*ABS(ABS(PD)-2.0*PDD))**2+SP2MP
237 GO TO 65
238 GO TO (999,999,243,999,245,246),IGT
239 (FOR MODE 4)
240 CCNTINUE
241 CCNTINUE
242 SR2=(17.0+0.24*ABS(RDD)+0.018*RDD*RDD)**2+SD2RJ
243 ST2=(0.000982+0.1681*TD*TD)**2
244 SP2=(0.000491+0.033*ABS(ABS(PD)-4.0*PDD))**2+SP2MP
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ZU=ZE/RE
XE=XU*RA
YE=YU*RA
ZE=ZU*RA
GE=SQRT(XE*XE+YE*YE)
VXA=GETVAL(VXFPA)
VYA=GETVAL(VYFPA)
VZA=GETVAL(VZFPA)
VGA=SQRT(VXA*VXA+VYA*VYA)
VA=SQRT(VGA*VGA+VZA*VZA)
VXI=VP*XU-VXA
VYI=VP*YU-VYA
VZI=VP*ZU-VZA
VI=SQRT(VXI*VXI+VYI*VYI+VZI*VZI)
ALFA=GETVAL(AFPA)
CA=COS(ALFA)
SA=SIN(ALFA)
BETA=BFPA(INDEX1)+FRACT*ANGLIM(BFPA(INDEX2)-BFPA(INDEX1))
CG=COS(BETA)
SG=SIN(BETA)
PZI=PFPA(INDEX1)+FRACT*ANGLIM(PFPA(INDEX2)-PFPA(INDEX1))
THE NEXT CARDS ELIMINATE AN EQUIVALENCE BY USING A DOUBLE
REPLACEMENT.
T33=CP=COS(PZI)
T13=SP=SIN(PZI)
Q1=VXI*CG+VYI*SG
Q2=VZI*CA-Q1*SA
Q3=VYI*CG-VXI*SG
VXF=Q1*CA+VZI*SA
VYF=Q2*SP+Q3*CP
VZF=Q2*CP-Q3*SP
(SET UP INDICES FOR VULNERABLE AREA INTERPOLATION)
F1=ATAN2(VYF,VXF)/QTRPI
IF(F1.LT.0.0)F1=F1+8.0
I1=F1
F1=F1-FLOAT(I1)
I1=I1+1
F2=ACOS(VZF/VI)/QTRPI
I2=F2
F2=F2-FLOAT(I2)
I2=I2+1
F3=AMIN1(7.599999999,VI/152.4)
I3=F3
F3=F3-FLOAT(I3)
I3=I3+1
O1=1.0-F1

```

C C

C C C





```

D2=1.0-F2
D3=1.0-F3
J1=I1+1
J2=I2+1
J3=I3+1
      (PERFORM LINEAR THREE DIMENSIONAL INTERPOLATION)
      AVT=D3*(D2*(D1*VAT(I1,I2,I3)+F1*VAT(J1,I2,I3))+
1      F2*(D1*VAT(I1,J2,I3)+F1*VAT(J1,J2,I3))+
2      F3*(D2*(D1*VAT(I1,I2,J3)+F1*VAT(J1,I2,J3))+
3      F2*(D1*VAT(I1,J2,J3)+F1*VAT(J1,J2,J3)))
      SET UP DISTRIBUTION SIZES OF OTHER SOURCES OF RANDOM ERROR
      SVA=XU*VXA+YU*VYA+ZU*VZA
      CVA2=VA*VA-SVA*SVA
      VMQ=.99*VMUZZ/RA-ASHCON
      DTI=(VMQ-SQRT(VMQ*VMQ-4.0*BSSHCON))/(2.0*BSSHCON)-T
      SLXMV2=CVA2*(DTI*VP/(VP-SVA/.99))**2
      SLYFR2=(0.010*VA**T)**2
      SLXFR2=SLYFR2*(1.0+CVA2/(VP-SVA)**2)
      SACAP2=(0.003*RA)**2
      SAOGJ2=(0.005*RA)**2
      SACBD2=(BDACCN(IGT)*RA)**2
      IF(IQEM.EQ.1)GO TO 68
      SAOPE2=(0.002*RA)**2
      GC TO 67
68 SAOPE2=(V*V-((X*VX+Y*VY+Z*VZ)/R)**2)*
1 RA2*(0.001463-7.478E-11*(R-1386.0)**2)**2
67 CDIST=SAOAP2+SAOGJ2+SAOPE2+SAOBD2
      CCMBINE ALL ERRORS INTO CNE DISTRIBUTION, COMPUTE BIAS
      SXA2=STT2*RA2
      SYA2=SPP2*RA2
      SYL2=CDIST+SLXMV2+SLXFR2
      CTT=XE/GE
      STT=YE/GE
      CPP=GE/RE
      SFP=ZE/RE
      BXA=X*STT-Y*CTT
      BYA=Z*CTT-(Y*STT+X*CTT)*SPP
      BXA2=BXA*BXA
      BYA2=BYA*BYA
      VAM=VXA*STT-VYA*CTT
      VAP=VZA*CTT-(VYA*STT+VXA*CTT)*SPP

```



```

VAM2=VAM*VAM
VAP2=VAP*VAP
VAI2=VAM2+VAP2
CD2=VAM2/VAI2
SC2=VAP2/VAI2
SXAT2=SYA2+CD2*SXL2+SD2*SYL2
TWOCOV=2.0*VAM*VAP*(SXL2-SYL2)/VAI2
DIF=SYAT2-SYAT2
DEN=2.0*SQRT(TWOCOV*TWOCOV+DIF*DIF)
HC2Z=DIF/DEN
CZ2=0.5+HC2Z
SZ2=0.5-HC2Z
SZCZ=TWOCOV/DEN
STUFF=2.0*SZCZ*BXA*BYA
BXF2=CZ2*BXA2+SZ2*BYA2+STUFF
BYF2=CZ2*BYA2+SZ2*BXA2-STUFF
SXF2=CZ2*SXA2+SZ2*SYA2+SZCZ*TWOCOV
SYF2=CZ2*SYA2+SZ2*SXA2-SZCZ*TWOCOV
AVTPI=AVT/PI2

CC
      COMPUTE PROBABILITY OF KILL
      STUFF=BXF2/(SXF2+AVTPI)+BYF2/(SYF2+AVTPI)
      IF(STUFF.LT.50.0)GO TO 75
      PK=0.0
      GO TO 78
75  PK=AMIN1(1.0,EXP(-.5*STUFF)*AVTPI/SQRT((SXF2+AVTPI)*(SYF2+AVTPI)))
78  PS=(1.0-PK)**ISB
      PK=1.0-PS
      TI=TIME+T

CC
      ACCUMULATE PK AS A FUNCTION OF INPUT TIME INTERVALS
      I=0
      I=I+1
      IF(TIME-GE.TINTER(I))GO TO 50
      J=I
      IF(TI-LT.TINTER(J))GC TO 52
      J=J+1
      GC TO 51
50  PTOTTF(I)=PK+PS*PTOTTF(I)
51  PTOTTI(J)=PK+PS*PTOTTI(J)
52  CPS=CPS*PS
      ACCUMULATE PK FOR EACH SPHERICAL SECTOR
      SPKT(I1,I2,I3)=PK+PS*SPKT(I1,I2,I3)

```

















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CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
65 DC 92 I=1,4
92 IFLAGS(I)=IFLAGS(I)+IPRINT(I)
C
C
PRINT PK AS A FUNCTION OF AIRCRAFT ASPECT AND IMPACT SPEED
C
C
IF(IPRINT(5).EQ.0)GO TO 80
CALL PRSEGS(SPKT2,ISL)
C
C
COMPUTE PK AS A FUNCTION OF ASPECT AND IMPACT SPEED FOR ALL GUNS
C
C
80 DC 36 I=1,32
DC 36 J=1,8
PK=RHO(I)*SPKT2(I,J)
36 SPKTOT(I,J)=PK+(1.0-PK)*SPKTOT(I,J)
C
C
STORAGE OF PK VS DENSITY FACTOR AND TIME INTERVALS (AT FIRE AND
INTERCEPT) PER WEAPON OR WEAPON COMPLEX
C
C
CPK=1.0-CPS
DC 55 I=1,NRHOS
D=RHO(I)
PK=D*CPK
PKTIDC(I)=PK+(1.0-PK)*PKTIDC(I)
DC 55 J=1,NTINTS
D1=D*PTOTTF(J)
PKTFDC(J,I)=D1+(1.0-D1)*PKTFDC(J,I)
D2=D*PTOTTI(J)
55 PKTIDC(J,I)=D2+(1.0-D2)*PKTIDC(J,I)
C
C
COMPUTE, STORE, AND WRITE TOTAL PKS FOR ENTIRE ARRAY OF WEAPCNS
C
C
F=FLOAT(NROUND/ISB)*IPERS
WRITE(7)ISL,IGT,IEM,ICB,ISB,IGL,XGUN,YGUN,ZGUN,TREACT,TTRACK,
1 CIRCLE,NROUND,F,CPK,NRHOS,RHO,NTINTS,TINTER,PTOTTF,PTOTTI,IPRINT
ISL=ISL+1
ASSIGN 70 TC IE0F
GC TO 15
70 ENDFILE 7
LINE=66
REWIND 7
PUNCH2 CARDS WRITE ONLY ONE CARD IMAGE ON TAPE4 WHEN THERE IS

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C ONLY ONE DEFENSE PER EMPLOYMENT (I.E., ONLY ONE "12" CARD
C BEFORE 7/8/9 END-OF-RECORD).
  K = ISL
  CALL PAGES(4,0,JP)
  WRITE(6,1033)
  ASSIGN 40 TC IE OF
79 READ(7) ISL,IGT,IEM,ICB,ISB,IGL,XGUN,YGUN,ZGUN,TREACT,TTRACK,
1 CIRCLE,NROUND,F,CPK,NRHOS,RHO,NTINTS,TINTER,PLOTTF,PLOTTI,IPRINT
  IF (EOF(7)).NE.0.) GO TO IE OF (4,12,40,70,83,9597,9999)
  IF (IOCHEC(7)).NE.0.) GO TO IERR,(3,28,9996)
  CALL PAGES(1,4,JP)
  IF (JP.EQ.0) WRITE (6,1033)
  WRITE(6,1034) ISL,CPK,NROUND,F,XGUN,YGUN,ZGUN,CIRCLE,IGL,
1 TREAT,TTRACK,IGT,IEM,ICB,ISB,ISL
  WRITE (4,1060) ITITLE(9),ITITLE(10),ISL,IGT,IEM,ICB,ISB,IGL,CPK,
1 NROUND,XGUN,YGUN,ZGUN,F,NUMBER
  GO TO 79
40 IF (K.NE.2) WRITE (4,1064) ITITLE(9),ITITLE(10),PKTIDC(1),NUMBER
  IF (IFLAGS(2).LE.0) GO TO 76
  REWIND 7
  CALL PAGES(4,0,JP)
  WRITE(6,1031) (I,I=1,10)
77 READ(7) ISL,IGT,IEM,ICB,ISB,IGL,XGUN,YGUN,ZGUN,TREACT,TTRACK,
1 CIRCLE,NROUND,F,CPK,NRHOS,RHO,NTINTS,TINTER,PLOTTF,PLOTTI,IPRINT
  IF (IPRINT(2).LE.0) GO TO 77
  CALL PAGES(1,4,JP)
  IF (JP.EQ.0) WRITE (6,1031) (I,I=1,10)
  WRITE(6,1032) ISL,(TINTER(I),I=1,NTINTS)
  IFLAG(2)=IFLAGS(2)-IPRINT(2)
  IF (IFLAGS(2).GT.0) GO TO 77
76 IF (IFLAGS(3).LE.0) GO TO 42
  REWIND 7
  CALL PAGES(4,0,JP)
  WRITE(6,1035) (I,I=1,10)
41 READ(7) ISL,IGT,IEM,ICB,ISB,IGL,XGUN,YGUN,ZGUN,TREACT,TTRACK,
1 CIRCLE,NROUND,F,CPK,NRHOS,RHO,NTINTS,TINTER,PLOTTF,PLOTTI,IPRINT
  IF (IPRINT(3).LE.0) GO TO 41
  CALL PAGES(2,4,JP)
  IF (JP.EQ.0) WRITE (6,1035) (I,I=1,10)
  WRITE(6,1018) ISL,(PLOTTF(I),I=1,NTINTS)
  DO 410 I=2,NTINTS
410 PLOTTF(I) = PLOTTF(I-1) + (1.0-PLOTTF(I-1))*PLOTTF(I)
  WRITE(6,1058) ISL,(PLOTTF(I),I=2,NTINTS)
  IFLAG(3)=IFLAGS(3)-IPRINT(3)
  IF (IFLAGS(3).GT.0) GO TO 41
42 IF (IFLAGS(4).LE.0) GO TO 71
  REWIND 7
  CALL PAGES(4,0,JP)

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43 1 WRITE (6,1036) (I,I=1,10)
    READ(7) ISL,IGT,IEM,ICB,ISB,IGL,XGUN,YGUN,ZGUN,TREACT,TTRACK,
    1 CIRCLE,NROUND,F,CPK,NRHOS,RHO,NTINTS,TINTER,POTTF,POTTI,IPRINT
    IF(IPRINT(4).LE.0) GO TO 43
    CALL PAGES(2,4,JP)
    IF(JP.EQ.0) WRITE (6,1036) (I,I=1,10)
    WRITE(6,1018) ISL,(POTTI(I),I=1,NTINTS)
    DO 430 I=2,NTINTS
    430 POTTI(I) = POTTI(I-1) + (1.0-POTTI(I-1))*POTTI(I)
    WRITE (6,1058) ISL,(POTTI(I),I=2,NTINTS)
    IFLAGS(4)=IFLAGS(4)-IPRINT(4)
    IF(IFLAGS(4).GT.0) GO TO 43
    IF(IFLAGS(1).LE.0) GO TO 44
    71 REWIND 7
    CALL PAGES(4,0,JP)
    WRITE (6,1017) (I,I=1,9)
    74 1 READ(7) ISL,IGT,IEM,ICB,ISB,IGL,XGUN,YGUN,ZGUN,TREACT,TTRACK,
    CIRCLE,NROUND,F,CPK,NRHOS,RHO,NTINTS,TINTER,POTTF,POTTI,IPRINT
    1 IF(IPRINT(1).LE.0) GO TO 74
    CALL PAGES(1,4,JP)
    IF(JP.EQ.0) WRITE (6,1017) (I,I=1,9)
    WRITE(6,1059) ISL,(RHO(I),I=1,NRHOS)
    IFLAGS(1)=IFLAGS(1)-IPRINT(1)
    IF(IFLAGS(1).GT.0) GO TO 74
    44 CALL PAGES(7+NTINTS,0,JP)
    WRITE(6,1019)
    WRITE (6,1021) (I,I=1,9)
    POTTF(1) = PKTDC(1,1)
    DO 440 I=1,NTINTS
    IF(I.EQ.1) GO TO 440
    POTTF(I) = POTTF(I-1) + (1.0-POTTF(I-1))*PKTDC(I,1)
    440 WRITE (6,1018) I,POTTF(I),(PKTDC(I,J),J=1,NRHOS)
    CALL PAGES(9+NTINTS,0,JP)
    WRITE(6,1020)
    WRITE (6,1021) (I,I=1,9)
    POTTI(1) = PKTDC(1,1)
    DO 441 I=1,NTINTS
    IF(I.EQ.1) GO TO 441
    POTTI(I) = POTTI(I-1) + (1.0-POTTI(I-1))*PKTDC(I,1)
    441 WRITE (6,1018) I,POTTI(I),(PKTDC(I,J),J=1,NRHOS)
    WRITE (6,1023) (PKTDC(I),I=1,NRHOS)
    CALL PRSEGS(SPKTOT,0)
    GO TO 95

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CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
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EEEE X X X IIII TTTT SSSS
E X X I T S
EEE X X I T SSS

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C      EEEEE X X X I I I I T SSSS
C      CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C      999 WRITE(6,1027)IGT,IEM
C      CALL EXIT
C      9994 WRITE(6,1040)
C      CALL EXIT
C      9995 WRITE(6,1039)
C      CALL EXIT
C      9996 WRITE(6,1037)
C      CALL EXIT
C      9997 REWIND 4
C      LINE = 66
C      ITITLE(3)=10H ***** FI
C      ITITLE(4)=1CHNAL SUMMAR
C      ITITLE(5)=1CHY *****
C      ITITLE(1)=ITITLE(2)=ITITLE(6)=ITITLE(7)=1H
C      CALL PAGES(3,0,JP)
C      WRITE (6,1061)
C      990 READ (4,1062) ICARD,IPRINT,I
C      IF (EOF(4).NE.0.) GO TO 991
C      CALL PAGES(1,3,JP)
C      IF (JP.EQ.0) WRITE (6,1061)
C      WRITE (6,1063) ICARD,IPRINT,I
C      IF (ISW.NE.10FF) CALL AVG(ICARD(3),IPRINT,ISH)
C      GO TO 990
C      991 REWIND 4
C      CALL TIMREM(TI)
C      CIO=CIO-TI+2.886
C      CALL SECOND(TU)
C      TU = TU + .C06
C      CPU=TU-CPU+0.
C      WRITE (6,1024) CPU,CIO,TU
C      CALL EXIT
C      9998 WRITE(6,1006)I,ICARD
C      CALL EXIT
C      9999 WRITE(6,1002)
C      CALL EXIT
C      1000 FORMAT(10E8.0)
C      1001 FORMAT(*,LOCAT ION*,I5,6X,*GUN TYPE*,I2,6X,*ERRCR MCDE*,I2,9X,
C      1002 1 *POSITION=(*,F7.0,*,*,F7.0,*,*,F7.0,*,*,RADIUS=*,F5.0,*,*M*/)
C      1003 1 *EXPECTED END-OF-RECORD/FILE ENCOUNTERED.*)
C      1004 1 *FORMAT(3X*TIME*,14X*XX*,7X*YYY*,7X*ZZZ*,12X*SPED*,6X*XDOT*,
C      1005 1 *6X*YDOT*,6X*ZDOT*,10X*HEADING*,5X*CLIMB*,6X*RCLL*/)
C      1004 1 *FORMAT(1X,F6.2,7X,3F10.1,7X,4F10.2,7X,3F10.2)
C      1005 1 *FORMAT(//*0XR=*,F5.2,*,*YR=*,F9.2,8X,*XT=*,F5.2,*,*YT=*,F9.2,8X,
C      1 *PSI=*,F7.2,8X,*DZ=*,F9.2)

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1006 FORMAT(///*-IMPRCPR INPUT CARD ENCOUNTERED.  ",I2,7A10,A8,*")
1007 FORMAT(I2,7A10,A8)
1008 FORMAT(6X,9E8.0)
1009 FORMAT(1X,5I1,E8.0)
1010 FCORMAT(*-VULNERABLE AREA (SQ. METERS) AS A FUNCTION OF IMPACT *,
1    *SPEED (METERS/SEC) AND ASPECT VIEW*/5X,8A10//* VIEW*,7X*0
2    152 305 457 613 762 914 1067 1219*//)
1011 FORMAT(1H-,I2,* TIME INTERVALS FOR PK ACCUMULATION*/4X*0.00*,
1    10F8.2)
1012 FORMAT(I2,F7.2,3F6.2,F6.0,2F12.7,2F6.1,2F7.0,F8.2,2F8.3)
1013 FORMAT(* LOCATION*,I5,6X,*GUN TYPE*,I2,6X,*ERRCR CODE*,I2,6X,
1    *POSITION=(*,F8.1,**,F8.1,**,F8.1,*),RADIUS=*,F6.1,* M*/*0L
2    FIRE MEAN FLT. INTCP FIRE INTCP *31X,*CLCSE AZIM. ELEV.
3    MEAN SIG2 BIAS1 BIAS2 TIME RATE RATE AZ.ERR EL.ERR
4    SIG1 SHOT PK CUM. PK*//)
5    AREA
1014 FORMAT(I2,I3,2F7.2,F8.2,2F7.0,1X,2F6.1,1X,2F7.1,F8.1,1X,2F7.2,1X,
1    3F7.2,2F10.6)
1015 FCORMAT(3X,I1,1X,I1,9E8.0)
1016 FCORMAT(6I1)
1017 FCORMAT(*- LCC*,I2X,9(7X*RHO*,I2)//)
1018 FCORMAT(I5,10F12.7)
1019 FCORMAT(*-ATTRITION ACCRUED AS A FUNCTION OF TIME OF FIRE*)
1020 FCORMAT(*-ATTRITION ACCRUED AS A FUNCTION OF TIME AT INTERCEPT*)
1021 FCORMAT(*0TIME*,5X*CUM FOR*,9(5X*DENSTY*)/* SEG.*,5X*CLASS 1*,
1    9(5X*CLASS*,I2)//)
1023 FCORMAT(1H0,10X,*TOTALS*,9F12.7)
1024 FCORMAT(///*-END OF JOB.*,9X*EXECUTION CPU TIME *,F7.2,9X*EXEC*,
1    *UTION (CPU + IO/2) TIME *,F7.2,9X*TOTAL CPU TIME *,F7.2)
1025 FCORMAT(*0G TIME/ MIN MAX AZIM ELEV MAX MUZZ
2    ALLISTIC BALLISTIC VEL VEL RANGE RANGE SMOOTH MAX.AZ
3    X.EL*/ * T ROUND ELEV ELEV RATE RATE TOF1 TOF2 VEL
4    NSTANT 1 CONSTANT 2 MIN MAX MIN MAX CCNST ERROR
5    RRROR*//)
1026 FCORMAT(I5,4X,*0.00*,8F8.2)
1027 FCORMAT(///*-GUN TYPE*,I2,* , ERRCR CODE*,I2,* . COMBINATION INVAL
1    IC.*)
1028 FCORMAT(1H-,I4,I2,9E8.0)
1029 FCORMAT(*- LCC*,I1,* DENSITY CLASSES FOR PK ACCUMULATION*/9F12.5)
1031 FCORMAT(*- LCC*,I3(6X,*TIME*,I2)//)
1032 FCORMAT(I5,10F12.2)
1033 FCORMAT(*- LCC*,5X*P(KILL)*,6X*ROUNDS*,3X*FIRE TIME*,8X*XGUN*,
1    8X*YGUN*,8X*ZGUN RADIUS GL*,5X*T REACT*,5X*T TRACK*,
2    *GT*EM CB SB LOC*)
1034 FCORMAT(I5,F12.7,I12,4F12.2,F9.2,I3,2F12.2,4I3,I5)
1035 FCORMAT(*- LCC*,I4(4X,*PK(TF*,I2,**)//)
1036 FCORMAT(*- LCC*,I4(4X,*PK(TI*,I2,**)//)
1037 FCORMAT(///*-UNRECOVERABLE PARITY ERROR DETECTED.  CALL EXIT.*)

```









C  
C  
C

```

THIS SUBROUTINE EXTENSIVELY MODIFIED TO PRINT ASPECT SECTOR
  ANGLES AND PROPERLY LABEL THE TWO CASES FOR WHICH IT
  PRINTS TABLES
COMMON /BLOCK3/ XGUN, YGUN, ZGUN
COMMON /BLOCK4/ IGT, IEM, ICB, ISB, IGL, CIRCLE
DIMENSION P(32,8), PT(8), ANG(8)
DATA ANG/7H315-360,7H000-045,7H045-090,7H090-135,7H135-180,
7H180-225,7H225-270,7H270-315/
1 PK=PT(1)=PT(2)=PT(3)=PT(4)=PT(5)=PT(6)=PT(7)=PT(8)=0.0
CALL PAGES(6,0,JP)
IF (ISL.GT.0) WRITE (6,1001) ISL, IGT, IEM, XGUN, YGUN, ZGUN, CIRCLE
IF (ISL.EQ.0) WRITE (6,1030)
WRITE(6,1040)
DC 2 I=1,32
IAZ = 1 + MCD(I,8)
IEL = 2 + (I-1)/8
PP=0.0
DC 3 J=1,8
PT(J)=PT(J)+(1.0-PT(J))*P(I,J)
PK = PK + (1.0-PP)*P(I,J)
3 PP=PP+(1.0-PP)*P(I,J)
CALL PAGES(1,6,JP)
IF (JP.NE.0) GO TO 2
IF (ISL.GT.0) WRITE (6,1001) ISL, IGT, IEM, XGUN, YGUN, ZGUN, CIRCLE
IF (ISL.EQ.0) WRITE (6,1030)
WRITE (6,1040)
2 WRITE (6,1041) I, ANG(IAZ), ANG( IEL), (P(I,J), J=1,8), PP
CALL PAGES(2,6,JP)
IF (JP.NE.0) GO TO 4
IF (ISL.GT.0) WRITE (6,1001) ISL, IGT, IEM, XGUN, YGUN, ZGUN, CIRCLE
IF (ISL.EQ.0) WRITE (6,1030)
WRITE (6,1040)
4 WRITE (6,1042) PT, PK
RETURN
1001 FCFRMT(=-PK AS A FUNCTION OF ASPECT SECTOR AND IMPACT SPEED.*,
1 5X*LOC*,I4,5X*GT*,I2,5X*EM*,I2,5X*X*,F7.0,3X*Y*,F7.0,3X*Z*,
2 F7.0,5X*RADIUS*,F5.0,*M*)
1030 FCFRMT(=-TOTAL PK FOR DENSITY CLASS 1 AS A FUNCTION OF ASPECT*,
1 * SECTOR AND IMPACT SPEED.*)
1040 FCFRMT(=)SECTOR AZIMUTH ELEV.*.8X*0-152 152-305
1 *305-457 457-610 610-762 762-914 914-1067*,
2 3X*1067-1219 TOTAL PK*/9X*REAR=00 DOWN=00*)
1041 FCFRMT(I7,2X,A7,2X,A7,8F12.7,F14.7)
1042 FCFRMT(1H0,18X*TOTALS*,8F12.7,F14.7)
END
SUBROUTINE TPLOT(NFPA)

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C





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C      PLOTS X VS. Y AND X VS. Z ON PRINTER FOR EACH FLIGHT PATH.
C      NO PLOT WHEN XMAX-XMIN IS LESS THAN 50.
C
C      COMMON      XFPA(1201), YFPA(1201), ZFPA(1201),
1      BFPA(1201), AFPA(1201), PFPA(1201),
2      VXFPA(1201), VYFPA(1201), VZFPA(1201)
C      DIMENSION PLOT(111)
C      LOGICAL XA, YAXIS, XAXIS, POINT/1H, 1H-, 1H+, 1H+/
C      DATA BLANK, YAXIS, XAXIS, POINT/1H, 1H-, 1H+, 1H+/
C      PLOT ONLY ABOUT 50 POINTS WITH "IFPA".
C      IFPA = MAX0(NFPA/50, 1)
C      FIND MIN-MAX VALUES OF X, Y, AND Z (ZMIN = 0. BY DEFN.)
C      XMIN = YMIN = 1.E99
C      XMAX = YMAX = ZMAX = -1.E99
C      DO 100 I=1, NFPA, IFPA
C      XMIN = AMIN1(XMIN, XFPA(I))
C      YMIN = AMIN1(YMIN, YFPA(I))
C      XMAX = AMAX1(XMAX, XFPA(I))
C      YMAX = AMAX1(YMAX, YFPA(I))
C      ZMAX = AMAX1(ZMAX, ZFPA(I))
C      CHECK X RANGE TO AVOID FUNNY X-Z PLOT.
C      X RNG = XMAX - XMIN
C      IF (X RNG .GT. 49.999) GO TO 110
C      CALL PAGES(3, 0, 1)
C      WRITE (6, 210)
C      RETURN
C      SCALE X, Y TO METERS PER CHARACTER.
C      D = AMAX1(X RNG/11., (YMAX-YMIN)/7.25)
C      DX = D/10.
C      DY = D/8.
C      CENTER PLOT BY RE-CALCULATING X-Y MIN-MAX.
C      XMIN = (XMAX+XMIN)/2. - 55.*DX
C      YMIN = (YMAX+YMIN)/2. - 29.*DY
C      XMAX = XMIN + 110.*DX
C      YMAX = YMIN + 58.*DY
C      SCALE Z (NOT TO SAME SCALE AS X-Y).
C      DO 120 I=1, 100
C      D = FLOAT(I*500)
C      IF (D .GT. ZMAX) GO TO 130
C      CONTINUE
C      DZ = D/10.
C      SEE IF AXES SHOULD APPEAR ON PLOT.
C      XA = .FALSE.
C      NYA = -1.0
C      IF (XMIN .LE. 0. .AND. XMAX .GE. 0.) XA = .TRUE.
C      IF (YMIN .LE. 0. .AND. YMAX .GE. 0.) NYA = 59 - INT(0.5-YMIN/DY)
C      IF (XA) NXA = 1 + INT(0.5-XMIN/DX)
C      SET 8 LINES PER INCH SPACING ON PRINTER.

```



```

C
WRITE (6,280)
SET PAGE CONTROL, PLOT X-Z, THEN X-Y.
CALL PAGES(56,0,1)
WRITE (6,250)
WRITE (6,220)
IFPA = 2 * IFPA
DO 160 K=1,11
DO 140 I=1,111
PLOT(I) = BLANK
140 IF (K.EQ.11) PLOT(I)=XAXIS
IF (XA.AND. K.NE.11) PLOT(NXA) = YAXIS
Z = FLOAT(11-K)*DZ
DO 150 I=1,NFPA,IFPA
IX = 1+INT(0.5+(XFPA(I)-XMIN)/DX)
150 IF (K.EQ.11-INT(0.5+ZFPA(I)/DZ)) PLOT(IX) = POINT
160 WRITE (6,230) PLOT,Z
WRITE (6,220)
WRITE (6,250)
WRITE (6,220)
IFPA = IFPA/2
DO 190 K=1,59
DO 170 I=1,111
PLOT(I) = BLANK
170 IF (K.EQ. NYA) PLOT(I) = XAXIS
IF (XA) PLOT(NXA) = YAXIS
Y = YMIN + FLOAT(59-K)*DY
DO 180 I=1,NFPA,IFPA
IX = 1 + INT(0.5+(XFPA(I)-XMIN)/DX)
180 IF (K.EQ. 59-INT(0.5+(YFPA(I)-YMIN)/DY)) PLOT(IX) = POINT
I = MOD(K,2)
IF (I.NE.1) WRITE (6,240) PLOT
IF (I.EQ.1) WRITE (6,260) PLOT,Y
190 WRITE (6,220)
PRINT X,AXIS VALUES.
D=10.*DX
DO 200 I=1,12
PLOT(I) = XMIN + D*FLOAT(I-1)
200 WRITE (6,270) (PLOT(I),I=1,12),DX,DY
RE-SET PRINTER SPACING BACK TO 6 LINES PER INCH.
WRITE (6,290)
RETURN
210 FORMAT(*ONEARLY CONSTANT X IN FLIGHT PATH. NC PLOT PRINTED.*/)
220 FORMAT(1X,113(1H*))
230 FORMAT(2H *,111A1,1H*,3X*Z =*,F8.1,* M*)
240 FORMAT(2H *,111A1,1H*)
250 1
FORMAT(2X*A*, 9X*B*, 9X*C*, 9X*D*, 9X**E*, 9X**F*,
9X*G*, 9X*H*, 9X*I*, 9X**J*, 9X**K*, 9X**L*)

```



```

260 FORMAT(2H *,111A1,1H*,3X*Y **,F8.1,*,M*)
270 FORMAT(4X(A)=*,F8.1,*,M**,4X**X(B)=*,F8.1,*,M**,
1 4X**X(D)=*,F8.1,*,M**,4X**X(E)=*,F8.1,*,M**,
2 4X**X(G)=*,F8.1,*,M**,4X**X(H)=*,F8.1,*,M**,
3 4X**X(J)=*,F8.1,*,M**,4X**X(K)=*,F8.1,*,M**,
4 4X**X(L)=*,F8.1,*,M**)
280 FORMAT(1HT)
290 FORMAT(1HS)
END
SUBROUTINE RPLANE(T)

```

CC

CCMPUTES INFORMATION ABOUT THE POSITION OF THE AIRCRAFT AT TIME =T

```

COMMON/BLOCK2/NFPA,TMIN,TMAX,DTFPA
COMMON/BLOCK3/XGUN,YGUN,ZGUN
COMMON/NFPARM/XA,YA,ZA,RA2,RA,TIME
COMMON/IGXGYG/IG,XG(8),YG(8)
COMMON/XFPA(1201),YFPA(1201),ZFPA(1201),BFPA(1201),AFPA(1201),
1 COMMON/PFPA(1201),VXFPA(1201),VYFPA(1201),VZFPA(1201)
* * *
COMMON/CECM1/IREFCM,IJ,GAINJ,IX,XSEC,CALX,PJh,
X,Y,Z,ROL,PIT,FDG,
FJGT,FJAM,GJ,SJT,SN
CALL INTERP((T+TIME)/DTFPA)
XA=GETVAL(XFPA)-XGUN-XG(IG)
YA=GETVAL(YFPA)-YGUN-YG(IG)
ZA=GETVAL(ZFPA)-ZGUN
RA2=XA*XA+YA*YA+ZA*ZA
RA=SQRT(RA2)
RETURN
END
FUNCTION ANGLIM(X)

```

CC

LIMITS ANGLES TO PRINCIPAL ANGLES BETWEEN -PI AND +PI

```

COMMON /CONSTS/ DEGREE,RADIAN,PI,PI2,QTRPI,SQRT2
IF(ABS(X)-PI)1,1,2
1 ANGLIM=X
RETURN
2 ANGLIM=X-PI2*FLOAT(IFIX((X+SIGN(PI,X))/PI2))
RETURN
END
FUNCTION RSHELL(T)

```

CC

CCMPUTES RANGE TO SHELL AT TIME = T

```

COMMON/VSASBS/VMUZZ,ASHCON,BSHCON,CQUAD
DQUAD=1.0+T*(ASHCON+T*BSHCON)
RSHELL=T*VMUZZ/DQUAD

```





```

RETURN
END
FUNCTION VSHELL(T)
  CCMPUTES SPEED OF SHELL AT TIME=T.  CAN ONLY BE USED AFTER A CALL
  TO RSHELL AT THE SAME TIME, SINCE RSHELL COMPUTES DQUAD FOR VSHELL

  COMMON/VSASBS/VMUZZ,ASHCON,BSHCON,CQUAD
  VSHELL=VMUZZ*(1.0-BSHCON*T**T)/(DQUAD*DQUAD)
  RETURN
END
SUBROUTINE INTERP(FINT)
  SETS CONSTANTS (FRACT, INDEX1, AND INDEX2) FOR TWO POINT INTER-
  POLATION

  COMMON/MAGIC/FRACT,INDEX1,INDEX2
  INDEX1=FINT
  FRACT=FINT-FLOAT(INDEX1)
  INDEX1=INDEX1+1
  INDEX2=INDEX1+1
  RETURN
END
FUNCTION GETVAL(ARRAY)
  PERFORMS TWO POINT INTERPOLATION

  COMMON/MAGIC/FRACT,INDEX1,INDEX2
  DIMENSION ARRAY(1201)
  GETVAL=ARRAY(INDEX1)+FRACT*(ARRAY(INDEX2)-ARRAY(INDEX1))
  RETURN
END
BLOCK DATA
  COMMON /BLOCK1/ ITITLE(10)
  COMMON /BLOCK3/ XGUN,YGUN,ZGUN
  COMMON /BLOCK4/ IGT,IEM,ICB,ISB,IGL,CIRCLE
  COMMON /BLOCK5/ NRHOS,RHO(9)
  COMMON /BLOCK6/ NTINTS,TINTER(10)
  COMMON /BLOCK7/ IVACOM(8),VAT(9,5,9)
  COMMON /BLOCK8/ TREATCT,TRACK1,TRACK2
  COMMON /BLOCK9/ TROUND(6),THDMAX(6),PHDMAX(6),PHIMIN(6),PHIMAX(6),
  VELMIN(6),VELMAX(6),RANMIN(6),RANMAX(6),ATLAG(6),
  ETHMAX(6),EPHMAX(6),RMODES(6)
  TFMAX1(6),TFMAX2(6),RVACON(6),RVBCON(6),VMUZEL(6)
  DEGREE,RADIAN,PI,PI2,QTRPI,SQRT2
  COMMON /BLOCKA/
  COMMON /CONSTS/
  COMMON /HEADFO/ LINE,NUMBER
  COMMON /BUDGET/ BDACON(6)
  VALUES ON "ASIDQC" CARDS FROM A.S.I. DOCUMENTATION DRAFT. (BEE)

```



```

DATA ATLAG /2*9999.99,1.33,9999.99,2*1.33/
DATA BDACON /00265,00501,0031,00697,00113,00113/
DATA DEGREE /57.295779513082/, RACIAN/0.01745325251594/
DATA EPHMAX /6*.1/ ETHMAX /6*.1/
DATA IGT /3/ IEM/4/, ICB/1/, ISB/4/, IGL/1/, CIRCLE/0./
DATA ITITLE /7*(1H),10H, ASD/XROA,1H,1H/
DATA IVACOM /8*(1H)/
DATA LINES /66/, NUMBER/0/
DATA NRHOS /9/
DATA NTINTS /10/
DATA PHDMAX /43633,43633,78540,34910,31416,3491/
DATA PHIMAX /1.48353,1.57079,1.48353,1.48353,1.51844,1.43117/
DATA PHIMIN /-1.17453,-1.14835,-1.17453,-1.17453,-.08727,-.06981,-.05236/
DATA PI /3.1415926535898/, PI2/6.2831853071796/
DATA QTRPI /0.78539816339745/
DATA RANMAX /3000,3000,3300,5000,5500,59599./
DATA RANMIN /0.0,400,500,0,0,99999./
DATA RHO /1.0,5.0,333333333,25.2,1.666666666,1.02,0.01/
DATA RMODES /-1.0,400,-1.0,1500,0.0/
DATA RVACON /1.80209,251499,22958,089321,07845,050694/
DATA RVBCON /0.12392,-.006259,-.006889,004262,-.000421,-.000357/
DATA SQRT2 /1.4142135623731/
DATA TFMAX CARDS PROVIDE EXACT AGREEMENT WITH AFATL PRCGRAM ON TEST (BEE)
DATA TFMAX1 /1.6,2.2,3.8,4.1,6.2,9.99/
DATA TFMAX2 /99.99,99.99,7.5,99.99,11.6,19.2/
DATA THDMAX /0.5236,5236,1.39626,0.52360,5236,5236/
DATA TINTER /10,20,30,40,50,60,70,80,90,999.99/
DATA TREAT /0/, TRACK1/2.5/, TRACK2/6.0/
DATA TROUND /75,4,2,75,857,4./
DATA VAT /405*0/
DATA VELMAX /300,300,350,250,300,999.9/
DATA VELMIN /0,0,0,0,0,999.9/
DATA VMUZEL /840,1000,930,880,560.0,800.0/
DATA XGUN /0./
DATA YGUN /0./
DATA ZGUN /0./
END
SUBROUTINE AVG(ITST,IPRINT,ISW)
DIMENSION IPRINT(6)
DATA IBLNK,SUM,CNT/2H,0.0,0.0/
DATA IALL/2HAL/
DECODE(10,900,IPRINT(1)) PK
FORMAT(F10.7)
DECODE(7,910,IPRINT(4)) YGUN
FORMAT(F7.0)
IF(ISW.EQ.1ALL) GOTO 600
IF(ITST.EQ.IBLNK) GOTO 200

```

900  
910

C  
C



```

150 IF(YGUN.NE.0.0) GOTO 150
    CNT=CNT+0.5
    SUM=SUM+PK/2.
    POLD=0.0
    GOTO 500
    CONTINUE
    CNT=CNT+1.0
    SUM=SUM+PK
    PCLD=PK
    GOTO 500
200 IF(CNT.LE.0.5) GOTO 500
    CNT=CNT-0.5
    SUM=SUM-POLD/2.0
    AVERG=SUM/CNT
    WRITE(6,800) CNT,AVERG
800 X FORMAT(/5X,18HAVERAGE P(KILL) ON,F6.1,20H OFFSET LOCATIONS IS,
    F10.7/)
    SUM=0.0
    CNT=0.0
    RETURN
500 IF(ITST.NE.IBLNK) GOTO 610
600 IF(CNT.NE.0.0) GOTO 201
    GOTO 500
610 SUM=SUM+PK
    CNT=CNT+1.0
    GOTO 500
END
SUBROUTINE MULPTH(I,REFC,EL,BIAS,SC2)
DIMENSION C(3),S(3),B(3)
DATA
    AK/-0.6931471806/
    ,SQR2/1.414213562/
    ,B/0.0244346,0.0314159,0.0785398/
    ,C/0.0132557,0.0185345,0.0478558/
    ,S/0.00872665,0.0104720,0.0244346/
    BW = B(I)
    CAL = C(I)
    SQR = S(I)
    DIR = EXP(AK*(SQ/BW)**2)
    EL2 = 2.*EL
    RUL = EXP(AK*((EL2+SQ)/BW)**2)
    RUL = EXP(AK*((EL2-SQ)/BW)**2)
    DRU1S = (DIR+REFC*RU)**2
    DRU2S = (DIR-REFC*RU)**2
    DRL1S = (DIR+REFC*RL)**2
    DRL2S = (DIR-REFC*RL)**2
    DIF1 = (DIR-REFC*RL)**2
    SUM1 = (DRU1S+DRL1S)

```





```

CIF2 = (DRU2S-DRL2S)
SUM2 = (DRU2S+DRL2S)
S1GER1 = DIF1/SUM1
S1GER2 = DIF2/SUM2
ANG1 = CAL*S1GER1
ANG2 = CAL*S1GER2
PPBY2 = ABS(ANG2-ANG1)/2.
BIAS = ANG1+PPBY2
SD = PPBY2/SQRT2
SC2 = SD*SD
RETURN
END
SUBROUTINE ECMI
DIMENSION RGB(3), PRW(3), FREQ(3), IRTYP(4), RNDISE(3)
DIMENSION TABJ(37,37), TABX(37,37)
COMMON /BLOCK1/ ITITLE(10)
COMMON /HEADFO/ LINE, NUMBER
COMMON
/CECM1/ IRECM, IJ, GAINJ, IX, XSEC, CALX, PJW,
X, Y, Z, ROL, PIT, HDG,
FTGT, FJAM, GJ, SGT, SN
**
**
**
NAMELIST/NAME1/RGB, PRW, FREQ, IRTYP, I, RG, WL, FTGT, FJAM, PJW
DATA
* RGB/40., 38.5, 28./
*, PRW/105000., 175000., 250000./
*, FREQ/15.1E9, 9.3805E9, 2.838E9/
*, IRTYP/1, 2, 2, 3/
*, PI4/12.56637061/
*, RNDISE/-123.0, -130.6, -132.2/
C
I = IRTYP(IRECM)
RG = 10.**(RGB(1)/10.)
WL = 2.998E8/FREQ(I)
RN = RNDISE(I)
FJAM = PRW(I)*RG*WL*WL/PI4/PI4
FJAM = PJW*RG*WL*WL/PI4/PI4
CALL PAGES(3, 0, JP)
IF(IJ.EQ.0) WRITE(6, 9003) GAINJ
FORMAT(/,/, * JAMMER ANTENNA GAIN*, F7.3, * DB*)
9003
IF(IJ.NE.0) WRITE(6, 9004)
FORMAT(/,/, * JAMMER TABLE SPECIFIED*)
9004
CALL PAGES(3, 0, JP)
IF(IX.EQ.0) WRITE(6, 9005) XSEC
FORMAT(/,/, * AIRCRAFT CROSS SECTION *, F9.2, * SQ.METERS*)
9005
IF(IX.NE.0) WRITE(6, 9006) CALX
FORMAT(/,/, * AIRCRAFT CROSS SECTION TABLE SPECIFIED. *,
9006
** PRINTED VALUES WILL BE MULTIPLIED BY CALX. CALX= *, F9.2)

```

C

C



```

C
C
C
IF(IJ.EQ.0) GO TO 1
JAMMER TABLE
CALL TABLR(TABJ,37)
DO 3 I=1,37
DO 3 J=1,37
TABJ(I,J) = 10.*(TABJ(I,J)/10.)
3 CCONTINUE
1 GJ = 10.*(GAINJ/10.)
1 IF(IX.EQ.0) GO TO 2
X-SECTION TABLE
C
C
CALL TABLR(TABX,37)
2 RETURN
C
C
ENTRY ECM2
NAMELIST/NAM2/ X,Y,Z,ROL,PIT,HDG,
*CX1,CY1,CZ1,CX2,CY2,CZ2,AZ,EL,GAINJ,XSEC,D2,SJ,ST,SJT
*,GJ
C
IF(IX.EQ.0 .AND. IJ.EQ.0) GO TO 5
CALL DIRCOS(X,Y,Z,0.,0.,0.,CX1,CY1,CZ1)
CALL CARROT(CX1,CY1,CZ1,ROL,PIT,HDG,CX2,CY2,CZ2)
CALL RECSPH(CX2,CY2,CZ2,AZ,EL)
IF(IJ.EQ.0) GO TO 6
CALL INTRP(TABJ,AZ,EL,37,GJ)
6 IF(IX.EQ.0) GO TO 5
CALL INTRP(TABX,AZ,EL,37,XSEC)
XSEC = XSEC*CALX
5 D2 = DIST2(X,Y,Z,0.,0.,0.)
SJ = FJAM*GJ/D2
ST = FTGT*XSEC/D2/D2
SN = 10.*ALOG10(ST)-RN
SJT = 10.*ALOG10(SJ/ST)
RETURN
END
SUBROUTINE JAMER2(IRAD,AJS,SDSQ)
DIMENSION AJS1(3),SD1(3)
DIMENSION AJS2(4),SD2(4)
DIMENSION AJS3(2),SD3(2)
DIMENSION AJS4(4),SD4(4)
GC TO (1,2,3,4),IRAD
DATA

```



```

* N1/3/ -5., 6., 9./
*, AJS1/ 0.002963, 0.01185, 0.1374 /
*, SD1/ INT2(N1,AJS1,SD1,AJS,SD)
1 CALL INT2(N1,AJS1,SD1,AJS,SD)
GC TO 5
DATA
* N2/4/ -2., 6., 10., 16./
*, AJS2/ 0.002963, 0.009877, 0.08278, 0.1374 /
*, SD2/ INT2(N2,AJS2,SD2,AJS,SD)
2 CALL INT2(N2,AJS2,SD2,AJS,SD)
GC TO 5
DATA
* N3/2/ 15., 30./
*, AJS3/ 0.0018, 0.01441 /
*, SD3/ INT2(N3,AJS3,SD3,AJS,SD)
3 CALL INT2(N3,AJS3,SD3,AJS,SD)
GC TO 5
DATA
* N4/4/ -2., 6., 10., 16./
*, AJS4/ 0.006514, 0.02173, 0.1024, 0.1374 /
*, SD4/ INT2(N4,AJS4,SD4,AJS,SD)
4 CALL INT2(N4,AJS4,SD4,AJS,SD)
5 SCSQ = SD*SD
RETURN
END
SUBROUTINE INT2(NVAL,X,Y,XVAL,YVAL)
DIMENSION X(NVAL),Y(NVAL)
YVAL = Y(1)
IF(X(1)-XVAL) 4,4,3
DO 1 I=1,NVAL
IF(X(I)-XVAL) 1,1,2
1 CONTINUE
YVAL = Y(NVAL)
GO TO 3
2 YVAL = Y(I-1) + (Y(I)-Y(I-1)) / (X(I)-X(I-1)) * (XVAL-X(I-1))
3 RETURN
END
SUBROUTINE JAMER1(PLEN,SDSQ)
SCR = PLEN*0.6826/2.*2.998E8
SDSQ = SDR*SDR
RETURN
END
SUBROUTINE TABLR(TABX,IDIM)

C SUBROUTINE TO READ AND PRINT A TABLE CF UP TO 37 X 37 ELEMENTS
C THE PROGRAM PROVIDES A DEFAULT VALUE FOR ELEMENTS OUTSIDE THE
C DEFINED TABLE.
C INPUTS ARE:

```





CARD	VARIABLE	FORMAT	DEFINITION
1	INAME	8A10	ARBITRARY IDENTIFICATION
2	NAZ	I5	NO. OF AZ ELEMENTS
	NEL	I5	(ASSUMING ELEMENTS 1 CORRESPONDS TO AZ=0)
	ELEND	F10.4	NO. OF EL ELEMENTS, EL GOES-ELEND TO +ELEND
	AZEND	F10.4	MAXIMUM ENTRY EL(DEG)
	DEFAULT	F10.4	MAXIMUM ENTRY AZ(DEG)
3+	TABX(IDIM,1)	8F10.0	DEFAULT VALUE
			DATA TABLE
	COMMON/TABLES/ELO,DELAZ,DELEL,JEL		
	DIMENSION TABX(IDIM,1),INAME(8)		
	DATA LE,LZ/2HEL,2HAZ/		
	DATA AZO,CDTR/O,.,.0174533/		
	READ(5,98) INAME		
	READ(5,99) NAZ,NEL,ELEND,AZEND,DEFAULT		
98	FORMAT(8A10)		
99	FORMAT(2I5,3F10.4)		
	IMPLIED INCREMENT		
C NOTE	DELAZ=AZEND/(NAZ-1)		
	DELEL=(2.*ELEND)/(NEL-1)		
C LOCATE	FIRST ELEVATION ENTRY ETC		
	JEL=(IDIM-NEL)/2 +1		
	MEL=JEL+NEL-1		
	ELO=-ELEND		
	WRITE(6,101) INAME,NAZ,AZO,AZEND,DELAZ,		
	1LZ,NEL,ELO,ELEND,DELEL,LE,DEFAULT		
101	FORMAT(*1, TABLE DATA*,/,1X,8A10,/,2(1X,I5,		
	1* ELEMENTS FROM *,F10.2,* TO *,F10.2,* BY *		
	2F10.2,2X,A2,/),* ELSEWHERE TABLE IS *,F10.2)		
C INSERT	DEFAULT		
	MAZ=(180./DELAZ)+1		
	IF ((MAZ.GT.37).OR.(MEL.GT.37)) GO TO 999		
	DO 8 IAZ=1,MAZ		
	DC 8 IEL=1,IDIM		
	TABX(IEI,IAZ)=DEFAULT		
C READ	TABLE		
	DO 14 I=JEL,MEL		
	READ(5,102) (TABX(I,J),J=1,NAZ)		
	CONTINUE		
14	FORMAT(8F10.0)		
102	IDELAZ=DELAZ		
	NPAGE=NAZ/13+1		
	DO 20 LP=1,NPAGE		
	JH1=(LP-1)*13+IDELAZ		
	JF2=JH1+12*IDELAZ		
	KH1=(LP-1)*13+1		
	KF2=KH1+12		



```

IF(LP.EQ.NPAGE)KH2=MAZ
IF(LP.EQ.NPAGE)JH2=180
WRITE(6,106)(JH,JH=JF1,JH2,IDE LAZ)
106 FORMAT(#1,RCS,MATRIX*,*,ELEV *,13I9)
JEL0=MAX0(JEL-1,1)
MEL0=MIN0(MEL+1,100)
ELPT=ELO-DELEL*(JEL-JEL0)
C PRINT TABLE
DO 15 J=JEL0,MEL0
WRITE(6,104)ELPT,(TABX(J,K),K=KH1,KH2)
104 FORMAT(IX,F7.1,2X,13F9.2)
15 CONTINUE
20 CONTINUE
C CONVERT TO RADIANS
DELEL=DELEL*CDTR
DELAZ=DELAZ*CDTR
ELO=ELO*CDTR
RETURN
999 CONTINUE
105 WRITE(6,105)
FORMAT(*,>>> ERROR IN INPUT <<<*)
STOP
END
SUBROUTINE CIRCOS(X1,Y1,Z1,X2,Y2,Z2,COSA,COSB,COSG)
XD=X2-X1
YD=Y2-Y1
ZD=Z2-Z1
D=SQRT(XD*XD+YD*YD+ZD*ZD)
CCSA=XD/D
COSB=YD/D
COSG=ZD/D
RETURN
END
SUBROUTINE CARROT(X1,Y1,Z1,ROL,PIT,HDG,X2,Y2,Z2)
C CARROT CARTESIAN ROTATION
C HEADING
X=X1*CSH(XDG)+Y1*CSH(YDG)+Z1*CSH(ZDG)
Y=-X1*SH(XDG)+Y1*SH(YDG)+Z1*SH(ZDG)
Z=X1*CH(XDG)+Y1*CH(YDG)+Z1*CH(ZDG)
C PITCH
XX=X*CSH(PIT)+Y*SH(PIT)
YY=Y*CSH(PIT)+X*SH(PIT)
ZZ=Z*CSH(PIT)+X*SH(PIT)+Y*SH(PIT)
C ROLL
X2=XX*CSH(ROL)+YY*SH(ROL)+ZZ*SH(ROL)
Y2=XX*SH(ROL)+YY*CH(ROL)+ZZ*SH(ROL)
Z2=-XX*SH(ROL)+YY*SH(ROL)+ZZ*CH(ROL)

```



```

RETURN
END
SUBROUTINE RECSPH(X,Y,Z,PHI,THE)
THE = ACOS(Z/SQRT(X*X+Y*Y+Z*Z))
THE=THE-1.5708
PHI=0.0
SB=SQRT(X*X+Y*Y)
IF(SB.NE.0.0)PHI=X/SB
PHI=ACOS(PHI)
PHI=ABS(PHI)
RETURN
END
SUBROUTINE INTRP(TAB,AZ,EL,NVAL,VALUE)
COMMON/TABLES/ELO,DELAZ,DELEL,JEL
DIMENSION TAB(NVAL,1)
A=ABS(AZ)
E=EL
AAZ=A/DELAZ+1.
IAZ=AAZ
EEL=(E-ELO)/DELEL+JEL
IEL=EEL
IAZ=MIN0(MAX0(IAZ,1),36)
IEL=MIN0(MAX0(IEL,1),36)
V1=TAB(IEL,IAZ)
V2=TAB(IEL,IAZ+1)
V3=TAB(IEL+1,IAZ)
V4=TAB(IEL+1,IAZ+1)
S=AAZ-IAZ
V12=V1+(V2-V1)*S
V34=V3+(V4-V3)*S
S=EEL-IEL
VALUE=V12+(V34-V12)*S
RETURN
END
FUNCTION DIST2(X1,Y1,Z1,X2,Y2,Z2)
XC = X2-X1
YC = Y2-Y1
ZC = Z2-Z1
DIST2 = XC*XD+YD*YD+ZD*ZD
RETURN
END

```





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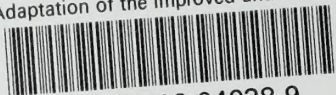
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